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THE TREATMENT OF ELEPHANTIASIS OF THE LEGS*

A Preliminary Report

BY JOHN HOMANS, M.D.†

ELEPHANTIASIS of the legs, though uncommon enough in temperate regions, is less rare than is generally supposed. The idiopathic or sporadic form, known as elephantiasis nostra, occurs more frequently than the familial form, usually called Milroy's or Meige's disease, which clinically and pathologically it resembles. The disease appears most often near the time of puberty, as if some glandular influence or the rapid elongation of the body which occurs at that period had something to do with its establishment. However, occasionally it appears in infancy and it has even been known to begin as late as the fifth decade.

Elephantiasis is distinguished by a very gradual onset of swelling in one or both legs. The edema first appears at the ankle and mounts, in the course of years, until the entire leg is involved, the upper limit being the inguinal ligament in front and the fold of the buttock behind. There are mild cases and severe ones. A mild case is controllable by bandaging and even if left to itself without bandaging may require ten years or more for its full development. A severe case may reach a very high degree of tense swelling in the course of a year or two. As the disease advances, the skin thickens and the subcutaneous tissues gradually harden until pitting on pressure can no longer be demonstrated. Finally, the superficial parts, especially near the ankle, are thrown into great folds with deep creases between.

In occasional and unpredictable instances, there will set in, once the leg has become tensely swollen, the remarkable febrile attacks which are so apt to complicate every sort of elephantiasis, tropical or other. These attacks are marked by heat, widespread redness and additional swelling of the whole limb, by a rapid rise in temperature, usually preceded by a chill, and are completely self-limited. Though often described as erysipelas, the redness and swelling do not creep, but come on at one moment. Abscess formation never occurs. As a rule, the total duration of any one attack is not over four to five days and though no immediate aftereffects are evident, a long series of these acute febrile upsets certainly aggravates the disease. Their cause has always been obscure, but the presence in the tissues of a nonsuppurative streptococcus has, in recent years, generally been admitted. Interestingly enough, in the experimental form* of the disease (in the dog), it has been shown that recurrent infections exactly similar to those of human beings occasionally set in. In these attacks, a streptococcus can be secured from the tissue fluids, but only for a few hours at the height of any attack.

In fully developed elephantiasis, the tissue fluids accumulate in the leg, as it were in a great sponge, the lowest portion of the sponge having the largest meshes and being the most thoroughly distended and fibrosed, while the upper part is little changed from the normal. Probably in the very mildest form of the disease, some valved lymphatic channels capable of transmitting fluid remain, especially in the thigh. In the severest form, there is no doubt that everything resembling a lymphatic vessel is destroyed. The lymphatics being destroyed, the tissue fluids circulate purely by gravity through dilated spaces in the connective tissue (whether or not lined with endothelium), that is, if the leg is raised up above the level of the body, the fluids will quickly flow into the body, and, if the leg is again lowered, the fluids flow back again. This back and forth flow may occasionally be demonstrated by the injection of certain dyes beneath the skin.

To show the remarkable capacity of the elephantiasic tissues for holding fluid, the case of Mrs. H. U. is cited:

> Mrs. H. U., a woman aged 36 years, whose disease began at 25 and was fully developed at 36, came under observation. Her lower leg presented the appearance of a great sac and was utterly unwieldy. By my advice, in preparation for operation, she elevated her leg for several days at home. Before doing this, she weighed herself and discovered that the differ-

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*Drinker, Field and Homans.

ence in weight before and after elevation was roughly 40 pounds. Forty pounds represents about 5 gallons. She, therefore, had a 5 gallon leg.

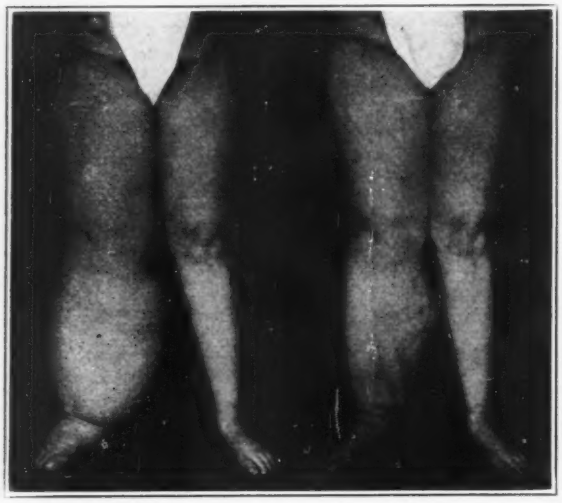

FIGURE 1. Elephantiasis nostra, in a young woman (H. U.). On the left, the leg before elevation. On the right, the leg after elevation for a week. Loss of 40 lbs. in weight during this period, which was marked by excessive urination. See figure 4, showing postoperative condition.

As for the disposal of this large amount of fluid, should it run out of the leg into the body, it has several times been observed that, as the leg empties itself, the corresponding flank and back of the trunk toward the shoulder become considerably swollen and at the same time the patient notices that the output of urine is astonishingly increased. The fluid, then, flows into the lymphatics draining the upper half of the body and is soon excreted.

The sort of elephantiasis pictured here is decidedly different from the kind that occasionally develops as a result of repeated infections, such, for instance, as may be associated with chronic ulcers, with epidermophytosis and very rarely with postphlebitic states. Whereas, in the one case, the febrile attacks *follow* the establishment of chronic lymph stasis, in the other, the leg is not enlarged previous to the infectious episodes and only becomes elephantiasic as the violent attacks are many times repeated. The distinction between the two sorts is usually clear, but I have under my care one patient whose elephantiasis dates from a femoral lymphadenitis. Since the removal of glands from his groin, the patient has suffered many febrile attacks, yet without any sign of ulceration or any other peripheral lesion. In this case, then, it is difficult to say whether the attacks are an effect or a cause.

An outspoken example of the ulcerated type in which repeated infections are clearly the cause of the swelling is the following:

Mrs. I. P., an obese woman, 36 years of age. Four years before coming under observation, she suffered from a typical milk leg on the left. At this time the right leg seemed to be only slightly affected but 6 months later, an ulcer appeared on the inner face of the lower right leg, the left leg being quite normal. Since then, this and other ulcers have persisted and appear to be the cause of very violent erysipelas-like attacks, confined to the leg from the knee down. As time has gone on, the whole leg, thigh included, has enlarged but only the lower leg is solidly indurated. Curiously enough, the protein percentage in this tissue fluid is very low by contrast with that of elephantiasis nostra.

FIGURE 2. Elephantiasis secondary to ulceration and infection, in a young woman (I. P.). On the right, the leg just after a violent febrile attack.

Before taking up the surgery of elephantiasis nostra, that is, the "idiopathic" form, a word might be said about the treatment of the ulcerated, primarily infected variety just described. Clearly, every effort ought to be made to heal ulceration and abolish infection. In one instance, the disease seems to have been halted by treating the evident epidermophytosis. In another, a lumbar sympathetic neurectomy has, for the time being at least, caused the chronic ulcers to heal and halted the disease. But, what to do next? The leg is still swollen and unwieldy. Can it be subjected to the plastic operations suitable to elephantiasis nostra? My own experience does not permit me as yet to answer that question.

THE SURGICAL TREATMENT OF ELEPHANTIASIS NOSTRA

It has already been explained that, in the elephantiasic leg, there are no longer present any functioning lymph vessels. Fluid flows back and forth through the dilated tissue spaces by gravity. The enlargement is altogether confined to the tissues superficial to the muscular anastomosis, the deeper parts showing no swelling. At first sight, it might seem as if these deeper, muscular parts were being normally drained of their lymph and as if Kondoléon's idea of conducting the superficial fluids beneath the aponeurosis might have some merit. But

actually the muscles have no lymph and my own search for lymphatics about the femoral vessels, by the use of dyes, has been quite fruitless. Moreover, explorations of the pelvis in elephantiasis have shown that the great lymph trunks which wind about the iliac vessels and through which all the tissue fluid from the leg must pass are fibrosed and at least partly, if not wholly, functionless. Therefore, upon every ground, there is reason to believe that no advantage can accrue from attempting to introduce lymph into the tissues beneath the muscular aponeurosis; as a matter of fact, no such operation is possible. Nor is there any advantage in endeavoring to establish a continuous channel in the superficial tissues of the leg toward the body, since dilated spaces capable of carrying lymph by gravity, but of course lacking in the valvular mechanism, are already present. Probably the attempt to make a connection between the superficial tissues and the deeper parts in well-established elephantiasis is like attempting to connect the upstairs and downstairs plumbing when the outlet to the street is obstructed.

It might be supposed that in such a disease, one would be able to find in the pelvis, or at the groin where all the lymphatics of the lower limb come together, some sort of obstructive lesion as the cause of the lymph stasis, an obstruction perhaps not complete enough to prevent an effective lymph drainage in early life but sufficient to cause a breakdown later. The explorations that I have made up to the present time have so far failed to reveal any such obstruction. On three occasions I have searched thoroughly along both sides of the pelvis and, although the lymphatics on the elephantiasic side were clearly fibrosed, thickened and as a rule functionless, there was no clear proof of an obstruction above. It is therefore impossible to say what actually is the cause of lymph stasis, but further explorations, both within the pelvis and in the leg itself, may perhaps in time reveal the causal factor or factors.

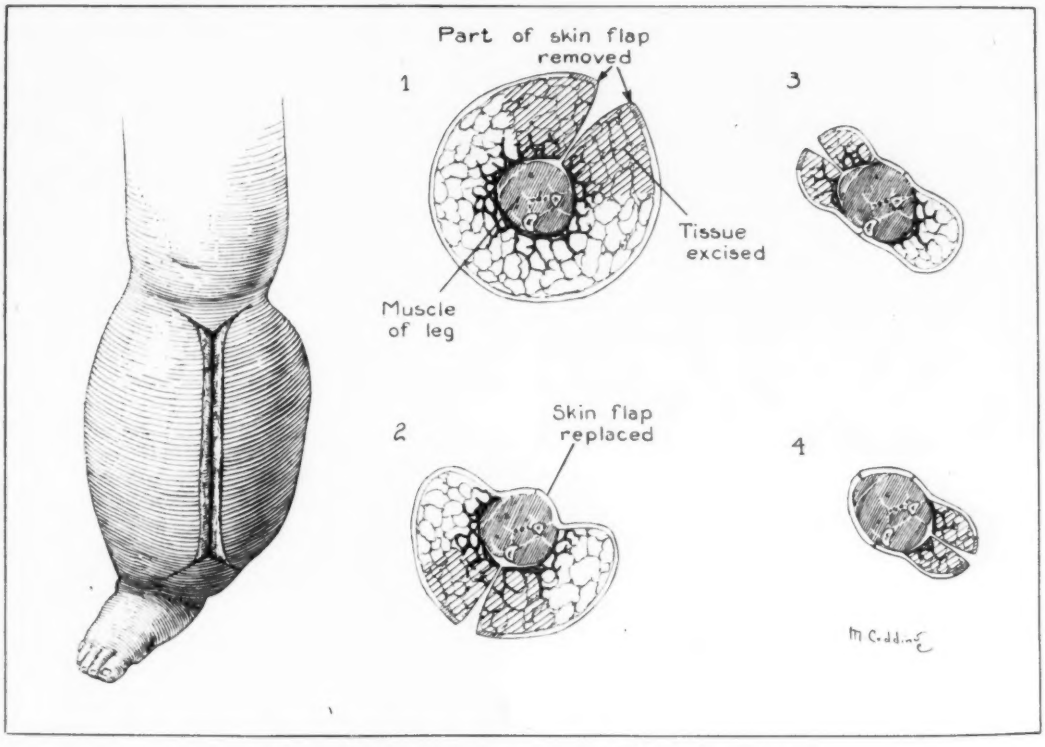

FIGURE 3. The plastic operation for elephantiasis (4 steps). On the left, the first incision. The cross sections show the tissue to be excised (shaded) and approximately the amount of skin flap removed (shaded) at each operation. Operations 3 and 4 are performed three months after 1 and 2. The heavy black shading indicates the region of thickest scar tissue, that often is permeated with lymph-filled spaces.

Treatment must be based upon such considerations.

In the *mild cases*, the edema is controllable by bandaging or is so far controllable that the leg never becomes unwieldy. If the leg is elevated at night, the fluid which *does* accumulate in the daytime disappears by morning.

In the *serious cases*, the limb becomes unwieldy and demands operative treatment. Operations today differ somewhat from the original procedure of Kondoléon, the object of which, as already explained, now appears to be unattainable. As a matter of fact, this operation ac-

tually removes a considerable amount of tissue in which fluid can form and accumulate, but this has in the past been rather accidental and the modification of Sistrunk is only slightly superior to the old plan. Auchincloss, who, in treating the tropical form of the disease, tried to remove as large an amount of filaria-containing tissue as possible, made use of what seems to me a sounder principle, namely, to make long, thin, longitudinal flaps of skin and subcutaneous tissue

FIGURE 4. The same patient (H. U.) shown in figure 1. On the left, operations 1 and 2 have been completed. On the right, operations 3 and 4, performed eight months later, have been completed. The thigh is reduced in size though it has never been subjected to operation.

which can be replaced upon the parts beneath the muscular aponeurosis, the intervening lymph-soaked tissue being removed. He confined his operation to the lower leg, regarding a continuous incision up to the body as not essential. However, Auchincloss did not make a definite proposal to do away with *all* the subcutaneous tissue of the leg, though he hints that this might be advisable. Actually, if the skin and a very thin layer of subcutaneous tissue are dissected up in a series of operations and replanted upon the approximately normal muscle, bone and tendon-sheath beneath the aponeurosis, there is very little need, in most cases, of carrying this operation into the thigh, for, if the formation of tissue fluid in the lower leg is reduced to a minimum, there will be less fluid to travel toward the body when the patient lies down, and accordingly there will be less swelling of the thigh. Meanwhile, the fluid which accumulates in the thigh itself, having a short course to take to reach the body, will flow on as before. Indeed, it has proved true in my hands that, once an effective series of operations is done upon the lower leg, the enlargement of the thigh is decidedly reduced.

The series of operations required is pictured in the accompanying sketches. Each is performed with the aid of an Esmarch bandage. At the first operation, long flaps are outlined on the anterointernal surface of the calf and the dissection is carried down at once *through* the aponeurosis. Thick flaps are then turned up, including the aponeurosis, so as to expose at least a quarter of the circumference of the leg. The actual, thin skin flaps are then prepared and the great mass of lymph-soaked tissue thus isolated by the dissection is excised. The Esmarch bandage which has controlled bleeding up to this point is now removed, the bleeding points, which are represented principally by a row of perforating arteries, are picked up and tied and the flaps are inspected to see whether their vascularity appears to be satisfactory. Should the edges appear cyanotic or unduly pale, it is easily possible to cut from them a considerable amount, for of course there is an excess of skin available. The flaps are then tacked to the deep parts with a series of fine chromic stitches so as to abolish dead space. Naturally, the long broad hollow thus formed in the leg must be carefully padded with gauze and solidly bandaged, so that the fluid from adjacent parts will not flow into it. Once it has healed in place, the skin will not float up again.

FIGURE 5. Elephantiasis nostra in a 15 year old boy. The first two plastics have been performed. Notice the scar of the first plastic across the foot. A second was carried out 3 months later at a higher level on the foot at the same time that plastics 3 and 4 (not shown here) were performed on the leg.

If there is a good deal of swelling of the foot, it may be necessary to perform similar operations there, but on a smaller scale, making the first incision *across* the foot and nearest to the toes, for the flaps turned up upon the foot can-

not be immediately adjacent to the lower end of the longitudinal flaps made at the same sitting. At a later date, when the third pair of flaps are being turned up and the first flaps upon the foot have acquired a blood supply, the second plastic can be done upon the top of the foot. No more than these two will usually be necessary.

Perhaps a week after the first operation upon the anterointernal face of the calf, a second plastic is carried out on the opposite, or posteroexternal face. In this, it is important to preserve

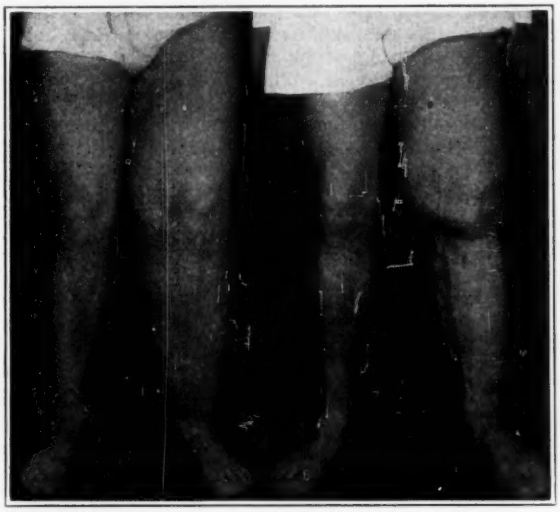

FIGURE 6. A rather unusual type of elephantiasis which followed a femoral adenitis. The thigh is disproportionately enlarged. A so-called Kondoleon operation was performed several years ago without effect. Only one scar (in the thigh) can be seen. On the right, plastics 1 and 2 have been performed. The wearing of an anklet has preserved the shape of the ankle.

at least a part of the nerve supply to the heel, that is, the sural nerve, a matter requiring a rather careful dissection. In other respects, the operation is just the same as the first one. In my experience, however, these posterior flaps cannot be left so broad as the anterior ones, being more likely to suffer from sloughing along their edges (poor venous return?).

Following this second operation, the patient is sent home wearing a bandage and is instructed to keep the leg elevated as much as possible. An interval of two months or so should probably elapse before the final pair of plastics is carried out. The reason for this is obvious enough. One cannot turn up a second thin pair of flaps whose bases are contiguous with the previous plastics until sufficient time has gone by for the local blood supply to adjust itself. As a matter of fact, the last two operations are very much easier than the first two. It is at one of the second pair that the second operation upon the foot, if such is required, must be done.

In all, there have been eleven cases of elephantiasis nostra. Of these, two may represent the familial disease and have not been treated. Of the rest, eight have been subjected to operation, but, owing to various contingencies, only four have accepted the complete plastic in four steps. The others, being greatly improved, have been satisfied with either two or three operations. Only the most recent cases have received what is held to be the standard treatment.

Apparently, replantations of the skin over the entire lower leg, and dorsum of foot, effect a satisfactory improvement in elephantiasis nostra. Operation on the thigh is not necessarily required. The use of a bandage for the leg after operation is probably necessary.

For elephantiasis due primarily to infection, the use of plastic operations is not clearly indicated.

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DISCUSSION

DR. TORR WAGNER HARMER: I can make no original contribution to this discussion either from experimental work or operative experience. It is an intriguing field of surgery. The literature is somewhat confusing due to efforts to explain the etiology of the different varieties and to classify them.

As I understand the situation, there are two main classes: (1) those which are primarily due to infection and (2) those which are primarily lymphatic obstruction. Practically all cases of both classes have superimposed several attacks simulating erysipelas before the characteristic elephantiasis develops with huge folds and deep creases.

In the infection class a thrombophlebitis or lymphangitis or lymphadenitis may produce more or less lymphatic obstruction. Lymphedema ensues. In this class may also be included the filarial cases. Even in this tropical form, Sir Peter Manson has pointed out that several erysipeloid attacks occur before the characteristic elephantiasis appears.

In the other class, in which lymphatic obstruction is primary, the cause is often unknown. Homans distinguishes a sporadic and a familial type (so-called Mulroy's disease). Edgar Allen of the Mayo Clinic uses the term *praecox* to separate a group in which the disease does not become manifest till the 10th to the 24th year from a clearly congenital group. His praecox group may really be cases of congenital lymphatic anomalies which carry on satisfactorily up to a certain period of growth of the body when this anomalous arrangement becomes inadequate.

In the lymphatic obstruction class fall the cases of lymphedema following radical breast amputa-

tions, whether this be due to thorough lymphatic ablation or to infection or metastases or irradiation. Many of us have a number of such cases and in them we are familiar with these so-called "attacks", fever, heat, redness and swelling, which Homans has described and has had occur in his dogs. One of my cases has had during the 15 years since her operation three such attacks. Incidentally she fell recently and dislocated the shoulder of her huge arm. Reduction was awkward but successful.

These attacks are followed by more fibrosis and thus a vicious circle is established. The retained lymph undergoes chemical changes. The protein content increases. The normal is about 1 per cent in the tissues and 7 to 8 per cent in the blood serum. That of the tissues in cases of elephantiasis runs from 3 to 5.5 per cent, in Homans's dogs about the same. The retained high proteid fluids induce fibrosis which, in further encroaching on lymphatic channels and destroying them, leads to more fluid,—and so on to "5 gallon legs".

Homans, Drinker and Field in their beautiful work on experimental elephantiasis recovered hemolytic streptococci at the beginning of the "attacks" in their dogs. The fluid curiously enough was inert when injected into normal legs but caused a typical attack when injected into elephantiasic legs. For such attacks in human beings, polyvalent streptococcus antiserum is rational. Alton Ochsner, following Matas, gives it once or twice a day till the temperature is normal and then once a month in 10 cc. doses. He believes that attacks are averted and that consequently the disease is retarded. I have used this serum with satisfaction for an attack in a case of marked lymphedema of the leg of the sporadic type.

Last year Bertram Bernheim reported a case of a boy, aged 3 years, upon whom he did a Kondoléon operation of slight extent preceded by a decompression of the femoral vessels with improvement and apparent arrest of the disease 3 years later. He believes that the decompression freed up lymphatic channels. This view is untenable after Homans's futile search for lymphatics along the femoral vessels.

In some types of lymphedema the lymphatics in the pelvis along the iliac vessels have been explored. In some of these cases lymphatic obstructions have been found, and permitting the abdominal drainage of the lymph has temporarily improved the condition of the leg. In other cases, however, these iliac lymphatics have been found fibrosed and thickened. As Homans has said, further exploration of these lymph channels is necessary.

The author has described the principles underlying the Kondoléon operation and Sistrunk's modification of it. He has also noted Auchincloss's new departure. Homans's operation is an Auchincloss procedure to the nth power. It is very radical on the leg but does not disturb the thigh. It seems to promise a more consistently high number of improvements and better cosmetic results. I congratulate Doctor Homans on his valuable contribution to this subject.

THE REPAIR OF CONTRACTURES RESULTING FROM BURNS

BY V. H. KAZANJIAN, M.D.*

THE problems presented to the surgeon by a seriously burned patient constitute some of the most serious and vexing ones of all traumata. These arise from the inception of the lesion and continue through the final plastic operations for the correction of deformities. The treatment, therefore, of this type of patient is a complex one. A review of the literature for the last twenty-five years reveals that a great deal of investigative and clinical work has been done to solve these complicated conditions.

The treatment of burns may be divided into three distinct stages. The first is the treatment of shock. This phase occurs immediately or within a few hours after the burn has taken place and must be dealt with adequately and vigorously before any treatment is given to the lesion itself. The second phase broadly includes the period of toxemia and infection. No definite time elements can be given for the second stage, since each patient presents an individual problem depending on the size, location and depth of the burn, and the general condition of the body as a whole. The third and final period of treatment deals with the repair of damaged tissues and the correction of deformity. This latter period of treatment should begin during the second phase. The results are much more satisfactory when the patient is conducted through his toxemia in a method most conducive to the prevention of deformity.

It is of utmost importance that the second and third stages of treatment are not divided too distinctly. The proper treatment of the toxemia and infection of the burned patient is primarily instigated for the purpose of saving the life of a patient, but it also has a distinct bearing on the sequelae. For example, even in many third degree burns there are many islands of epithelium at the base of the hair follicles and in the sebaceous tissues that are not destroyed at the time of the injury. If the local treatment keeps the burned areas free from infection throughout the period of convalescence, these islands will grow and spread into a soft pliable covering. The incidence of skin grafting and contractures is thus lowered. Again, even in burns which are sufficiently deep to destroy all epithelium, local treatment that tends to prevent infection makes for the rapid appearance of healthy granulations. This allows early surgical intervention and a consequent lessening of deformity.

The present paper deals primarily with the problems of repair of deformities resulting from burns. No extensive discussion will be carried on as to the proper methods of handling the infectious stage. At the present time the tannic

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acid treatment advocated in 1925 by Davidson, and Aldrich's gentian violet treatment brought out in 1932 seem to be the two most widely accepted. Neither of these treatments answers all the problems presented by the burned patient. The surgeon handling large burns usually has and needs a great many methods for dealing with complications.

At times the burn is not seen in its early stage. Home treatment has usually been instituted and, by the time the surgeon sees it, the burn is infected and resembles an old ulcer with a certain amount of cellulitis surrounding it. This type of burn responds best to a preliminary treatment of a daily wash composed of equal parts of tincture of green soap and hydrogen peroxide. After the area is cleansed with this mixture, a nonirritating mild antiseptic dressing is helpful. Certain burns, even though handled properly from the first, reach an indolent stage when there is little or no proliferation of granulation tissue. When this point is reached any previous treatment should be stopped and one of the cod liver oil ointments applied. Granulations usually begin building up within three or four days after the treatment. Sometimes this indolent phase occurs in the process of epithelialization. An ointment composed of scarlet red, oxyquiniline sulfate and chloretone is of great value in causing a further spread of the skin.

Undoubtedly the most suitable time to begin reparative work in burns is before the scar tissue begins to form contractures. In this stage the tissues are relaxed. Deep fibrous bands under the granulations have not become evident. It is obvious, however, that this cannot be done unless the area is in a healthy receptive condition. Hence, from the point of view of successful repair it is important to have the burned area itself practically aseptic and the patient in general good health.

In its earliest stage the surgical repair of burns is accomplished almost exclusively by the free transplantation of skin. The pinch-graft method originally introduced by Reverdin in 1869 is still used extensively. It has certain advantages over other methods of grafting which make it especially suitable as an early method of repair. First, it can be applied successfully to an unepithelialized area not wholly free from infection without submitting the patient to general anesthesia. Secondly, in extensive burns one frequently cannot find donor areas sufficiently large from which to borrow skin to cover the lesion. Sufficient pinch-grafts can generally be secured to distribute over a large surface. There are two drawbacks that make pinch-grafts undesirable in some burns. They are not suitable for exposed parts of the body, especially the face, as the cosmetic result is poor; and each pinch-graft is usually surrounded by a dense scar which takes a long time to become soft and pliable.

With the exceptions of the conditions mentioned above, the Thiersch graft (called split-graft by Blair and razor-graft by Gillies) is preferred to the pinch-graft for the repair of clean granulating wounds as well as burns. The area to which it is applied is immediately covered with epithelial tissue. In the case of a successful "take" it gives quick relief to the patient, prevents deforming contractures, and shortens the period of hospitalization and convalescence.

Requisites of Skin Grafting

Thiersch grafts can be applied successfully over large areas providing the following fundamental points in technic are respected:

1. The raw areas must be practically free from infection. This can be effected by the proper preoperative treatment of compresses of normal sterile saline alternating with compresses of Dakin's solution for a period of twenty-four hours before the graft is done.
2. The surface area must be one composed entirely of healthy granulations.
3. Exuberant granulations should be removed with a sharp razor with as little trauma to the underlying tissues as possible.
4. Complete hemostasis must be secured immediately after the removal of the granulations. Usually compression of the wound with warm sterile saline packs for a few minutes is sufficient to stop capillary bleeding. In rare instances the application of gauze saturated with adrenalin chloride is advisable, since one must avoid tying vessels with catgut or silk as much as possible.
5. The location from which the graft is taken is prepared with any of the accepted antiseptic technics. It is sometimes of aid to paint the donor area with a thin film of flexible collodion. While the present method in cutting skin is far from ideal, the use of Blair's suction retractor and a very sharp razor knife is better than any other method known to the writer. The graft should be large enough completely to cover, in one piece if possible, the recipient area.
6. The graft should be spread over the raw area evenly and held in position with fine silk sutures. It is not necessary to approximate the borders accurately. In fact, it is even desirable to overlap the periphery of the wound in order to make sure that the entire raw area is covered. The excess skin may be excised later.
7. The graft should be covered with a non-adhering, non-irritating dressing such as crepe de lys, perforated paraffin mesh or Cargile membrane. For dressings, Dr. I. Davis has advo-

cated a sterile sea sponge. A wet surgical-gauze dressing, however, is just as effective.

8. The grafted area should be immobilized with a pressure bandage. Any one of the patented weave cotton bandages will do. The greater control there is of fixation the better the chance for success.

After-Care

The dressing should be left in position for about four days. If there is any evidence of infection, manifested by pain, tenderness, high pulse, or fever, the wound should be inspected sooner. Some surgeons do not disturb it for even a longer period than four days, but in my experience with grafts covering large areas, I find it more advisable to inspect the wound at the end of this period. If one finds isolated areas of necrosis or blebs, they should be carefully excised and the wound dressed daily.

Full Thickness Grafts

This type of graft offers an exceedingly valuable method to use in a limited area. This is especially true of the hands, neck, axillary fold and occasionally over the face. It may be removed from its bed in a uniform thickness with a sharp knife. The abdominal wall is an ideal donor site if a sufficiently large piece is required. The skin should be carefully sutured over the wound. In this type of graft it is highly desirable to cut the skin according to the pattern of the wound and to approximate the borders as accurately as possible. The disadvantage of the Wolfe graft when applied to the face is that its color is at times objectionable and the chances for a successful "take" are less than that of the Thiersch graft.

Limitations of Skin Grafting

While the various forms of skin grafting are exceedingly valuable for the repair of deformities from burns, yet one is always aware of their limitations.

1. A free graft does not keep its original size. Its rate of contraction differs in various locations. Skin grafts of a moderately hard base, such as the forehead, the nose, the hands and fingers, and the chest, contract less than when they are transplanted over loose tissues.

2. Skin grafts do not contain enough subcutaneous tissue, and lacking fat they often do not afford enough bulk to give sufficient contour. This is especially important when the face and exposed parts of the body are involved and also in places where it is essential to pad the defect with fat as well as skin.

We may evaluate the true picture of various methods of repair of skin defects by taking as an example an unsightly scar covering a small area. We excise the scar, and approximate the borders, suturing them as carefully as possible, provided this can be done without causing undue tension on the surrounding tissues. The skin around the wound is usually undermined, in order to relieve such tension. Many minor defects can be repaired by this method owing to the elasticity of the skin. However, if this causes distortion to the surrounding parts, especially to the face, lips, and eyelids, or if the defect is too large to approximate the borders successfully, our next recourse is to borrow skin tissue from the immediate neighborhood of the wound in the form of a sliding or transposed flap. We can frequently repair many extensive deformities by utilizing tissues that surround the lesion. This is the so-called pedicled graft. The Indian, as well as the French method of rhinoplasty is based upon this principle. In the repair of larger defects, particularly of the lips, it is unquestionably logical. In extensive contractures one may advantageously use pedicled grafts, supplemented with skin grafting, if necessary.

Pedicled Grafts

By a pedicled graft or flap we mean a mass of tissue, containing usually the skin and subcutaneous fat which is raised from its bed but is left attached to the surrounding skin at a selected position of its periphery. Esser describes similar flaps in which the skin is entirely cut, but a portion of the subcutaneous tissue is left attached. These he calls "island flaps". Pedicled flaps may be obtained from nearby tissue or from a distant part. They may be single or multiple. There are three methods of obtaining pedicled flaps.

1. The French method of sliding flaps from nearby tissue, allowing little or no torsion of the pedicle.

2. The Indian method in which the flap is again obtained from nearby the defect and is shifted to its new position by a twist of the pedicle. The pedicle of the flap in this method may be next to the deformity or it may bridge over normal tissue to allow the flap to be placed in its new position.

3. The Italian or tagliacotian method in which the flap is borrowed from distant areas, usually from the arms.

Tube or Rope Grafts

There are conditions where the deformity covers a greater area of the face than can be corrected by the use of sliding flaps. In these cases we are obliged to seek a more distant source of supply for the necessary skin and subcutaneous tissue. For this purpose a tube or rope flap (Gillies) can be prepared from the covered parts of the body, such as the upper arm, thorax, abdominal wall or the back, and through a series of operations can be transplanted to cover the defects of the face. The advantages of this

method are the prevention of additional scarring of the face and the securing of an almost unlimited amount of tissue. There are, however, some disadvantages which should be considered in borderline cases. The skin of the protected parts of the body does not harmonize with the normal tissue of the face owing to a difference of texture, although in time nature may tend to lessen this difference. This procedure also requires a longer period of hospitalization and many more operations are necessary than when tissues from the immediate vicinity can be utilized.

Treatment of Specific Areas

The treatment of deformity resulting from burns varies according to the extent and location of the lesion. Any portion of the body may be involved, but the parts most frequently affected are the face and neck, arms and hands, and less frequently the lower extremities. Deformity of the face may involve the greater part of that portion of the body, causing cicatricial contraction of the nose, eyelids, mouth, ear, eyebrows and chin. A brief outline of the treatment of various isolated deformities about the face will be considered.

Eyelids. Severe burns of the eyelids, or of that portion of the face near the eyelids, often lead to marked ectropion. These conditions cause extensive exposure of the eyeball and may affect the sight. The lower lid is usually involved more frequently than the upper. Skin grafting is quite useful in repairing contractures of the upper eyelid, but it is not nearly so successful for the repair of extensive ectropion of the lower lid. For this reason it has been the author's habit to repair the lower eyelid with a transposed flap of skin from the temporal region or even from the forehead. This method, as will be seen from the illustrated cases, seems to be quite positive and efficient. The transplanted tissue has a great deal of bulk, contracts very little, and where the action of the orbicularis oculi muscle is lost, this type of repair helps to support the lid in a comparatively safe position. The same advantages cannot be claimed for a full thickness graft on the lower lid. The temporal flap is especially suitable for eyelid repair because of its proximity. For blood supply one of the branches of the temporal artery may be included in the flap tissue and thus larger flaps may be cut in proportion to the base than from localities where the course of the blood vessels is not so favorable.

Usually the resulting defect when a flap is taken from the temporal or frontal regions may be closed by approximating the borders of the wound. This is especially true in older patients where there is a great deal of relaxation of the skin. If the defect cannot be closed by approximation the secondary wound should be repaired with a Thiersch graft.

If the repair of the face involves large areas for which it is advisable to transpose a bigger delayed flap from a distant part of the body, the repair of the eyelids is done with this tissue at the same time.

Cheeks, Nose and Mouth. Isolated dense scars of the cheek, nose, or mouth regions are best repaired by free skin grafts. In the repair of a small defect a moderately large piece of skin may be taken from the back of the ear without causing any distortion of the contour of that organ. Skin from behind the ear is especially suitable for repairs of the face because it also is an exposed part of the body and blends more favorably with the texture of the face than skin taken from a covered part of the body. When the greater part of the face is involved it may be advisable to use a larger delayed flap from a distant portion rather than depend upon multiple skin grafts which may not have such good cosmetic results.

Neck. In treating contractures of the neck, several fundamental things must be considered before one can determine the best procedure to follow. The extent of the deformity, the amount of tissue lost, the nature of the scar—whether it is soft or indurated, superficial or deep, the amount of contracture, and finally the existence of normal tissue in the surrounding parts—all of these factors influence the technic and type of repair to be used.

In slight contractures there is usually a vertical scar line forming a web that pulls the chin downward or sideways. The rest of the neck tissue is usually normal. In such cases the well-known "Z" incision is the best method of repair. This allows the use of the skin in the immediate neighborhood of the defect in a simple and satisfactory manner.

In cases where there is dense scar tissue involving a large portion of the neck area, the "Z" incision cannot be employed. This type of contracture is best treated with a full thickness or short graft taken from the abdominal wall. Frequently the vertical suture lines at the junction of normal and transplanted skin have a tendency to form web-like contractures which may have to be repaired later by the "Z" incision.

Certain types of neck contractures are best handled by the use of a sliding flap from the lower part of the neck, the remaining raw area being covered with a free skin graft. This method in selected cases gives a better cosmetic effect and permits greater freedom in the movements of the neck.

For large burns involving the entire front of the neck and upper part of the chest where the chin is almost adherent to the upper edge

of the sternum, one is obliged to take tissue from a distant part of the body. For this purpose, delayed pedicled flaps are most efficient.

Contractures of the Axillary Region

Contractures of the axillary region resulting from burns may be so slight as to cause no limitation of motion, merely exerting a tension on the skin of the upper arm and chest when the arm is fully extended over the head. From this mild degree of pathology the contracture may vary up to a complete web binding the arm to the chest wall. The slight contractures are quite common in the axillary region. Here again the "Z" incision gives the most satisfactory results. Frequently a long band is repaired by a series of "Zs". If the injury has been too extensive and this method does not allow the arm sufficient free motion, sliding flaps supplemented by skin grafts for the resulting raw areas should be used. It is advisable, however, to extend the lateral flaps from the "Z" incision under the axillary fold and place the skin graft below at the lateral aspect of the chest.

In extensive contractures it is not unusual to find a large part of the upper arm adherent to the chest wall. The web thus formed is frequently composed of dense scar tissue. If the burn was severe enough to destroy the skin of the axillary fold, it probably also injured the skin of the chest which is more exposed. This condition naturally complicates the plan of the repairing operation. It is often necessary to prescribe frequent massage and heat treatments in order to increase the vascularity of the entire area and to soften the deeper scars. In contractures of this type we rely on delayed pedicled grafts as the main source of donor skin supplemented by skin graft. The pedicled graft may be prepared from the back or scapula region, lateral or anterior part of the abdominal wall, and gradually transferred to the axillary region. Gillies's method of using the wrist of the opposite arm to act as a carrier for the rope flap is advised if circumstances warrant the use of tissue from the opposite side of the body.

Contractures of the Hands and Fingers

Contractures of the hands and fingers resulting from burns on those regions result in the most serious disabilities. These disabilities usually form a grave economic problem for most patients. The joints of the fingers often become partially dislocated or ankylosed. Scar tissue lessens the vascularity of the fingers and complicates repair.

In the majority of such cases the full thickness graft operation is the procedure of choice. This applies especially to the palmar and dorsal surfaces of the hand. In doing a pedicled graft the hand may be successfully attached to the abdominal wall and enough skin for the repair borrowed from that area. If this method is elected, it is not necessary to make a tube flap since this prolongs the process unnecessarily. After excising freely the scars about the hand and cutting through the deep adhesions, the raw area may be covered directly by a pedicled graft from the abdominal wall. After a reasonable time the pedicle should be separated.

In patients with old burns we frequently find no definite contracture, but a pathological change in the texture of the skin. It becomes thick and tense and seems to remain in that condition indefinitely. In the arms and legs, especially of children, this thickness of the skin leads to an atrophic condition of the extremity involved. A certain number of these dense scars undergo degenerative change and become malignant. It is advisable, therefore, to operate and release the tension of the skin in selected cases. The operation consists of excising the keloid scar sufficiently to allow complete relaxation of the tissues. The resulting raw areas are repaired by free skin grafts. Not infrequently when the tension of the particular area is released, increased blood supply will cause the surrounding skin to become soft and more elastic.

This brief description of the repair of contractures of various parts of the body following burns is not intended to be dogmatic. Each individual patient presents specific and variable problems. It is impossible to classify them empirically. Each case should be studied carefully from the viewpoint of determining the exact condition of the scar and surrounding tissues, and the method chosen for repair must be simple and must be the answer to the existing problem. It should be one that requires the least hospitalization and should offer the least risk of failure. This last is very important, as a failure creates complications which lead to longer disability, or in some cases prevents complete success.

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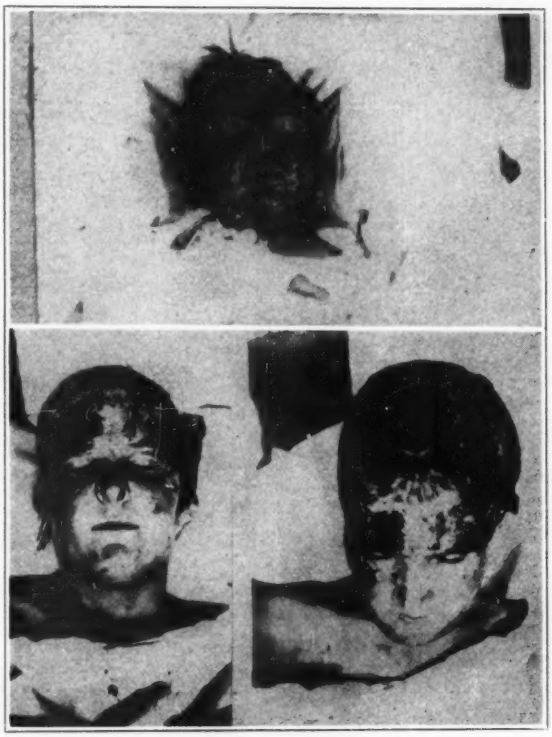
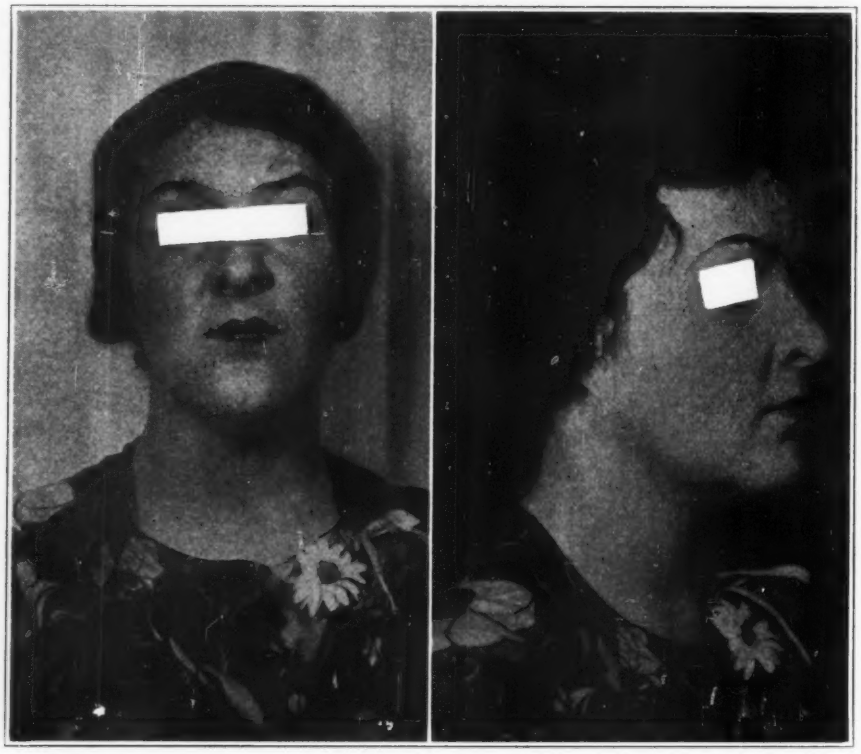


CASE 1. FIG. 1.

CASE 1. FIG. 2.

CASE 1. This patient suffered severe burns about the face and head when a celluloid eye shield caught fire while she was studying. The burn involved the entire upper part of the face including the nose, eyelids, forehead and part of the scalp (fig. 1). From the beginning she was treated with gentian violet. As soon as the wounds were clean, free transplantation of skin was done over the forehead, temporal region and nose, as these areas were markedly involved by third degree burns. In this respect it was interesting to see that after a little while the areas that received early transplantation of skin were smooth and free from keloid scars; while the lower part of the face, where burns were more superficial, epithelialized itself very quickly, yet developed thick, keloid scars (fig. 2).

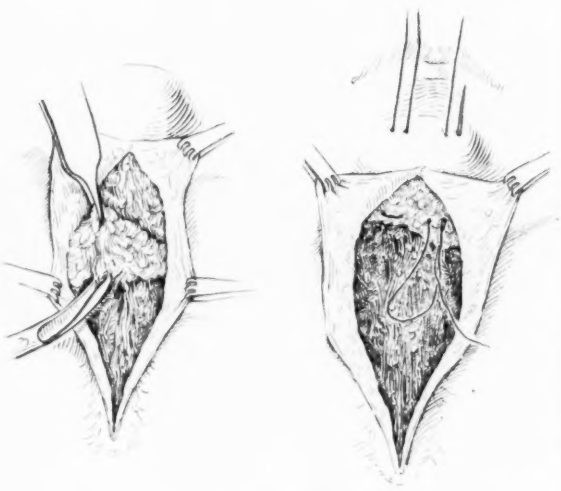
This patient was seen again in 1936. The keloid scars had become softened and smooth. The texture and the color of the skin were naturally different from the normal skin (fig. 3).



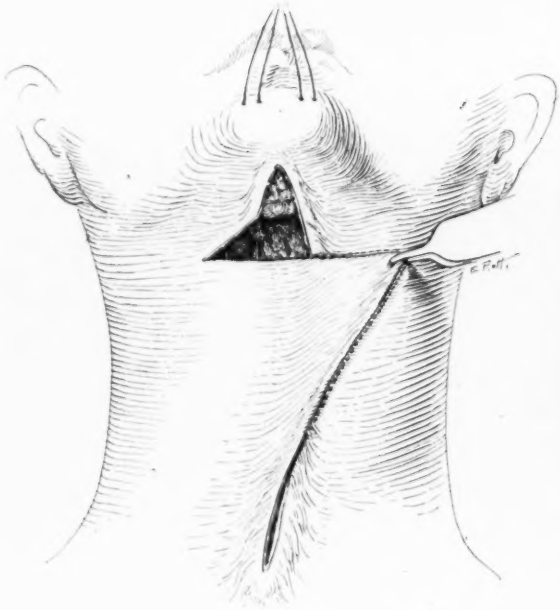
CASE 1. FIG. 3.

CASE 2. This patient, aged 22 years, had a birthmark of the neck which had been operated upon in childhood and the birthmark removed. She was later operated upon again for the removal of the scar. As she grew older, there developed a web-like scar extending from the median line of the chin to the base of the lower part of the neck (figure 1). This scar line had a considerable effect upon the contour of the chin. She was operated upon under ether anesthesia and the scar was excised. The skin on either side was undermined quite extensively and part of the fatty tissue was dissected from under the chin and brought forward to assume a position in front of the symphysis (fig. 2). This was done to give a little more prominence to the chin. The familiar "Z" incision was made above and below, through the skin on each side, creating two triangular flaps (fig. 3). Their positions were interchanged (as seen in the diagram) and then sutured into position (fig. 4). This procedure gave free motion in flexion and extension without injuring the skin (fig. 5).

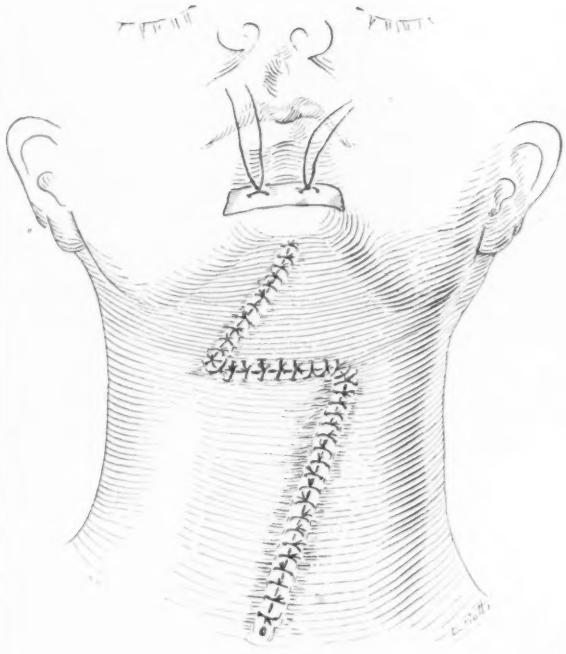
CASE 2. FIG. 1.



CASE 2. FIG. 2.



CASE 2. FIG. 3.



CASE 2. FIG. 4.

CASE 2. FIG. 5.

CASE 3. FIG. 1.

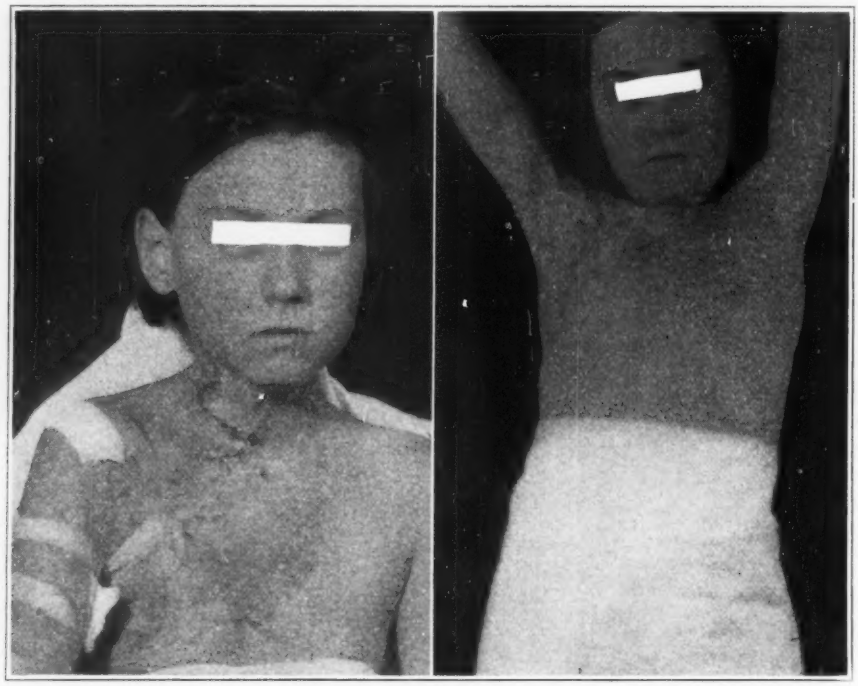
CASE 3. This patient, aged 6 years, was first seen 4 years after she had been severely burned. Examination showed marked contraction of the right side of the neck caused by a deep indurated scar (fig. 1). This contraction was causing considerable distortion of the face and corner of the mouth. She was operated upon; the scar of the neck excised, and all the deep fibrous bands separated. This resulted in a raw area approximately 3 by 4 inches in diameter. A full thickness skin graft was removed from the abdominal wall and transplanted to the neck to cover this defect. The borders of the transplant were carefully sutured to the surface of the wound with fine silk. The surface of the transplant was covered with cargile membrane and padded with moist gauze, and a pressure bandage was applied. The patient made an uneventful recovery and used an Ace bandage in the form of a collar for 2 months following the operation (fig. 2).

CASE 3. FIG. 2.

CASE 4. This patient, aged 7 years, was burned while playing with matches on July 4, 1927. When I first saw her, a year later, there was marked contraction of the neck, and dense scar tissue had spread over the chest and axillary region (fig. 1). The upper arm was adherent to the chest wall to a considerable extent. She was operated upon and the scar of the neck was excised. The deep adhesions were cut through until the neck was free from limitation of motion. The raw area was covered

CASE 4. FIG. 1.

CASE 4. FIG. 2.

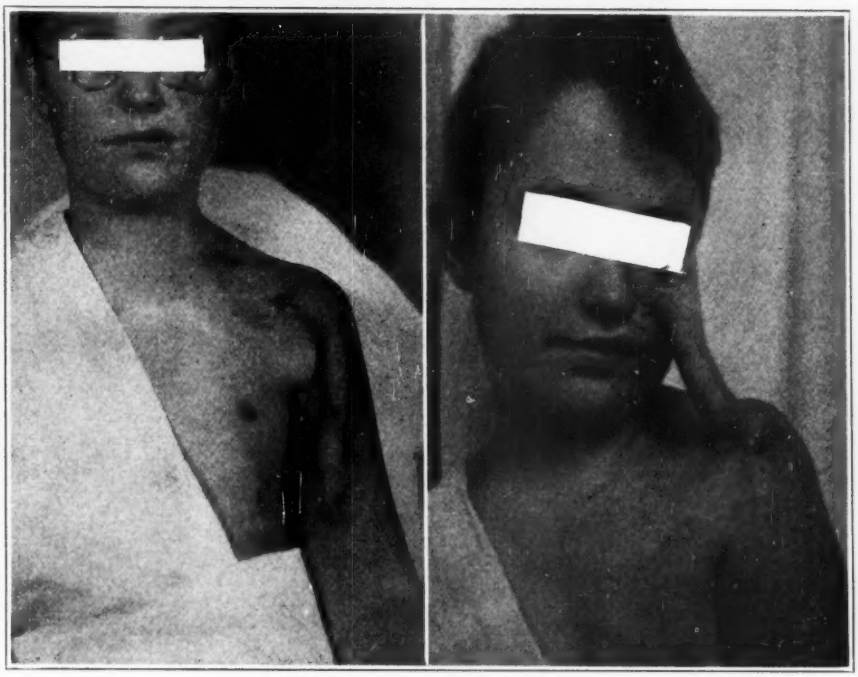


CASE 4. FIG. 3.

with a full thickness graft taken from the abdominal wall. She made an uneventful recovery following this operation. Later the suture lines formed slight keloid scars and it was necessary to excise them in another operation by making a modified "Z" incision. The axillary repair was accomplished by making a long tube flap below the scapula region, extending downward to the abdominal wall (fig. 2). This tube flap was eventually spread in front of the chest and axillary region (fig. 3).

CASE 5. FIG. 1.

CASE 5. This patient was injured in an automobile accident when he was 7 years old. Evidently he suffered only injuries to the soft tissues of the face with considerable loss of skin tissue as there was no evidence of bony injury when I saw him 4 years later. He had had skin grafting following the in-



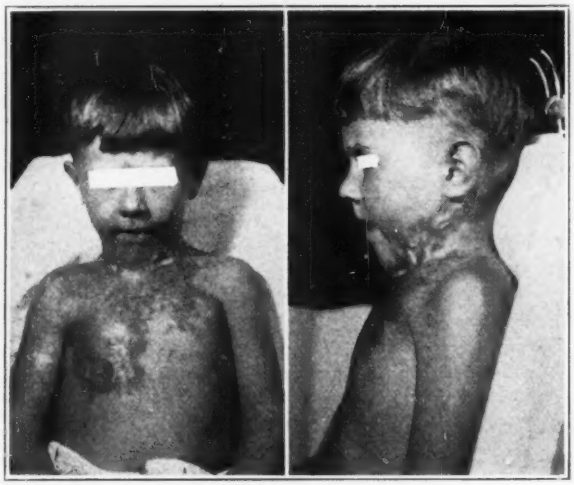
CASE 5. FIG. 2.

jury, but my examination showed considerable distortion of the left lower eyelid and the corner of the mouth (fig. 1). The skin grafts about the face were quite conspicuous both in appearance as well as in contour. In undertaking this case I felt that it would be advisable to use a delayed, pedicled

CASE 5. FIG. 3.

graft from the inner surface of the upper arm. This was done in five stages. The graft was spread over the face, which gave a satisfactory contour to the face as well as the corner of the mouth and eyelid (fig. 2). The patient, now 17 years old, has been seen recently. The color of the transplanted skin is blending quite well except for the hair-bearing areas (fig. 3).

CASE 6. This patient, aged 5 years, was accidentally thrown into a bonfire July 15, 1932. I saw him for the first time Nov. 1, 1932. Examination showed thick keloid scars covering almost the entire front of the chest down to the umbilicus, and on the right side extending toward the axillary border causing considerable contracture (fig. 1). The skin of the



CASE 6. FIG. 1.

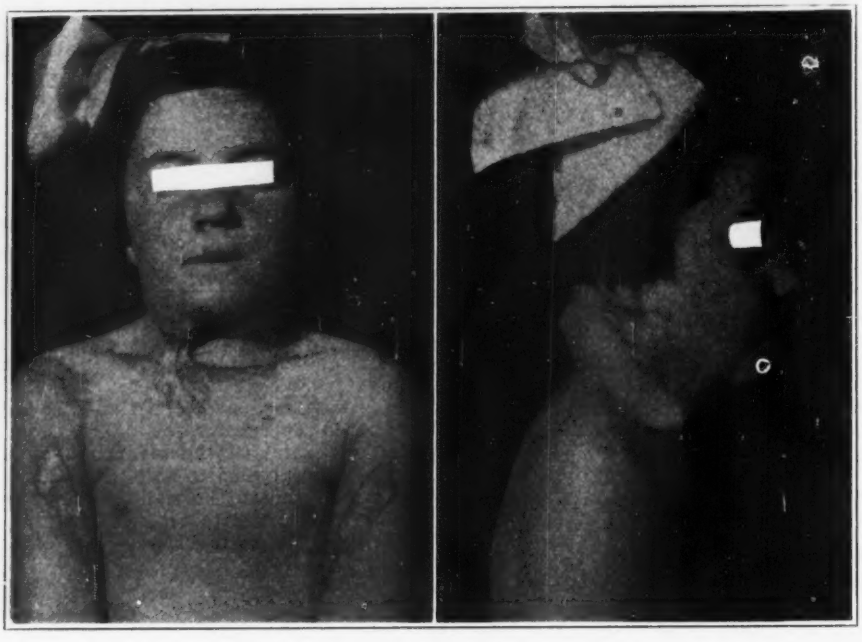
neck was badly burned and the chin retracted toward the sternum. There were also some hard keloid scars scattered over the right shoulder. It was decided in this case to use a tube flap to repair the neck and in the meantime massage and heat were to be applied to soften the scars. A rope graft was prepared on the right scapular region and gradually transferred to the neck in four stages (fig. 2).

CASE 6. FIG. 2.

CASE 6. FIG. 3.

It was surprising to see that as soon as the adhesions of the neck were released the patient began to have greater freedom of the movements of the arm (fig. 3).

CASE 7. This patient, aged 5½ years, was burned when her clothing caught fire from a gas stove. She received treatment at a local hospital. When I first saw her, 18 months later, she had scars over the arms and chest, which were more or less hard and elevated, but there were no contractures. The neck was pulling to the right and was partly adherent to the chest by a thick scar band (fig. 1). She was operated upon under ether anesthesia and the scars freely excised until the neck assumed a free position. The resulting raw area, approximately 2 by 4 inches in diameter, was closed by sliding a flap of skin from the side of the neck. The patient made an uneventful recovery. She used a pressure bandage in the form of a collar for a number of months (fig. 2).



CASE 7. FIG. 1.

CASE 7. FIG. 2.

CASE 8. This patient, aged 6 years, was scalded with hot water, which resulted in contraction of the right side of the neck (fig. 1). She was operated upon under ether anesthesia and all the scars and deep adhesions were removed. This resulted in a raw area approximately 3 by 5 inches in diameter. The borders of the skin about the wound were undermined freely which helped to reduce the size considerably. A full thickness graft was then removed from the inner surface of the right upper arm and sutured over the neck. There was no difficulty in approximating the borders of the arm wound. A pressure bandage was applied to both the neck and the arm. The patient made an uneventful recovery (fig. 2).

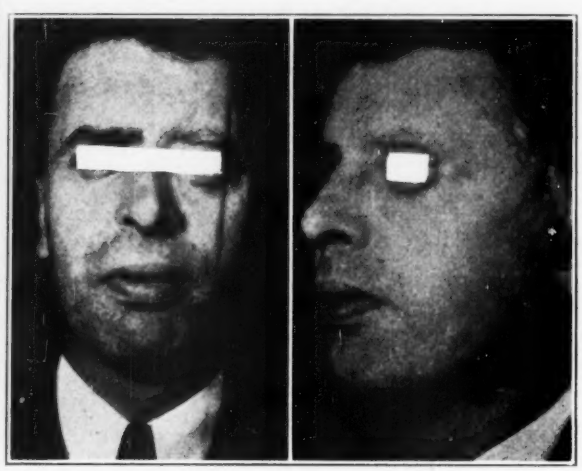
CASE 8. FIG. 1.

CASE 8. FIG. 2.

CASE 9. This patient, aged 29 years, received injury of the left eye from sulfuric acid burns. Examination about 6 weeks later showed a practically complete, quite dense leukoma of the left cornea, through which only the peripheral iris could be seen (fig. 1). The patient also had retraction of

CASE 9. FIG. 1.

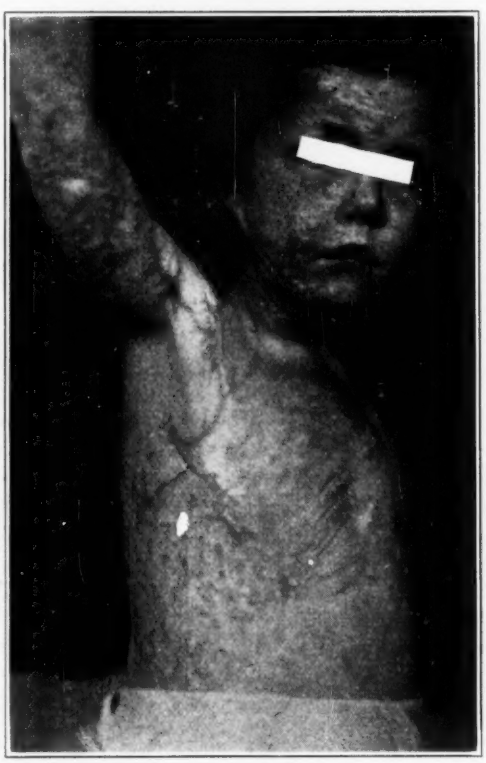
the left upper and lower eyelids. Repair was done in the following manner: An incision was made just below the supra-orbital ridge over the skin of the upper eyelid, and the skin was undermined for a short distance. Then an incision was made just below the tarsus of the lower lid, and the skin was undermined for a very short distance. A small skin graft (oval-shaped) was taken from the posterior aspect of the right ear. This was cut into two parts and a part was placed on each eyelid, upper and lower. The grafts were sutured with fine silk. Post-aural incision was closed with dermal sutures. Boric ointment was put over the eye, and cargile membrane placed over it. A pressure bandage was applied to both the eye and the ear. The dressing was left intact for 4 days and afterward it was changed daily. The patient made an uneventful recovery. On the advice of an ophthalmologist, a thin eye shell was inserted over the eyeball and this helped the cosmetic effect materially (fig. 2).



CASE 9. FIG. 2.

CASE 10. This patient, aged 4 years, was burned while playing with some matches in her crib. The burned area involved the entire left side of the chest wall extending well over the midline in front, the abdominal wall, both arms, right side of face, right side of neck, and the right ear. The burns were entirely third degree. She was under the care of Dr. Aldrich who treated the burns with gentian violet. He used pinch-grafts from the left thigh to the abdominal wall as soon as that area was clean and in a receptive state for grafting. When healing was finally complete, she developed considerable contraction of the right axillary region due to a web formation. There was a band in the right antecubital fossa which flexed the forearm and upper arm. Another band on the flexor surface of the wrist caused considerable distortion of the thumb and hand (fig. 1).

CASE 10. FIG. 1.



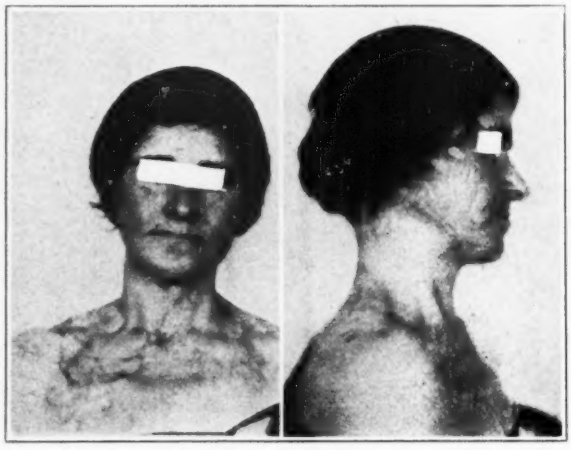
CASE 10. FIG. 2.

The patient was operated on twice. The first operation consisted of repairing the axillary region by the use of a series of "Z" incisions. In the next operation a Thiersch graft was applied to the wrist and elbow. Figure 1 shows the child before the first operation. Figure 2 shows the child after the second operation. A third operation will be done on the right thigh and groin for the removal of dense scar (fig. 2).

CASE 11. This patient, aged 29, developed an acute ulcerative infection of the neck and chest in April 1927, which terminated in an indolent lesion. She was first seen by me July 24, 1927 (3½ months later). Examination showed a raw, granular, and suppurating surface involving the entire right side of the neck from the symphysis along the border of the lower jaw to the back of the ear, down to the greater part of the neck and shoulder and reaching as far as the upper border of the chest. This ulcerated surface extended to the left side and to the center of the shoulder with a raw area about 10 by 10 cm. in diameter (fig. 1). There were a number of small suppurative pockets along the lower part of the chest. The tissues bordering the wound were rather dark red in color and seemed to be lacking in vitality. Previous to my seeing her, the patient had been instructed to apply Dakin's solution to the

CASE 11. FIG. 1.

wound to clean the ulceration and to control the suppuration. I found the wound fairly clean, but it was not free from suppurating pockets at different places especially around the borders. While this condition was not due to a burn, there was enough destruction of the skin and subcutaneous tissue to simulate a third degree burn. It was evident that if the wounds were allowed to heal without surgical interference, a great deformity of the neck and chest would take place. Therefore, it was decided to prepare a rectangular flap to be used to cover the raw area of the neck, and to do a free transplantation of skin over the chest wound. This operation was done in three stages (fig. 2).



CASE 11. FIG. 2.

RETROPHARYNGEAL ABSCESS*

BY LYMAN RICHARDS, M.D.†

IN any surgical condition in which the preponderant number of cases progress to an uneventful and successful outcome, it is easy to lose sight of the less frequent but ever present instances of complications or even fatalities. Thus, when, on perusal of records of cases of retropharnygeal abscess in children, one encounters again and again the brief and reassuring operative note that the abscess was "opened and drained in the routine manner", one is apt to conclude that there at least is a condition unassociated with any appreciable risk and unlikely to cause the surgeon any particular anxiety. Nevertheless, a survey of a group of reports of retropharyngeal abscess at once brings to light the fact that the mortality rate is far greater than one would at first anticipate and that the condition, regarded by those experienced in it with serious surgical respect, is fraught with a danger of possible complications still not adequately appreciated by the general practitioner or pediatrician. Thus in 1921 Frank[1] reported a mortality of 6.7 per cent in a series of seventy-four cases, Babbitt[2] in 1924 of 10 per cent in fifty cases, Guthrie[3] in 1926 of 15 per cent in twenty cases, and Greenwald and Messeloff[4] in 1929 of 7.3 per cent in fifty-five cases. This astonishingly high average is somewhat reduced by the figures of Bokay, whose large series of 317 cases showed only a fatality percentage of 4.4. The most encouraging statistics are those of Wishart,[5] who lost only one case in a group of forty-one, and this a preoperative fatality in a moribund patient.

This generally high mortality average has prompted me, first of all, to examine a series of 162 cases of retropharyngeal abscess seen at The Children's Hospital in Boston during the past ten years and, secondly, to inquire into the causes and factors that tend to render the condition still one to be regarded with no little apprehension from the operative standpoint. As a result of this summary, I have arrived at certain facts and conclusions which it is hoped will be helpful to those who from time to time are confronted with the problem of dealing with this often critical and potentially dangerous situation. This paper does not deal with the anatomic aspects of the condition. These have been repeatedly and adequately covered by numerous authors. The fundamental existence of retropharyngeal glands which drain the nasopharynx and which, once infected, may break down and suppurate, is a well-established fact. I am concerned primarily with pointing out certain errors and pitfalls in the diagnosis of the presence of retropharyngeal abscess and in its surgical treatment, which contribute to a

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mortality rate, as is apparent from the figures submitted, far higher than is commonly supposed. My own fatalities in 162 cases were twelve, or 7.4 per cent.

Male children are more frequently affected than female, in this series in a ratio of 2 to 1, the exact ratio reported by Guthrie. This differs from the finding of Greenwald and Messeloff,[4] whose cases were equally divided in this respect. My oldest patient was 12 years of age, the youngest 4 months, the average age being 14 months. By far the greatest number of patients fell within the age group of from 6 months to 3 years. Similar figures have been reported by numerous authors. In Brooks's[6] series, 75 per cent were under 3 years of age, while, in the group reported by Greenwald and Messeloff,[4] 85 per cent of the cases occurred within the first two years. Sixty per cent of Babbitt's fifty cases occurred in the first year of infancy, while in Frank's[1] series of patients 90 per cent were under 3 years of age. Obviously, the condition is essentially one of infancy and, as will be pointed out later, the condition in the older children differs quite markedly in its clinical manifestations from that in the infants.

Anatomically, the retropharyngeal glands are paired and bilateral. Infection tends, fortunately enough, to be uniformly unilateral and in my series occurred on the right side in eighty instances, on the left in fifty-four, and in the remainder it was not specified. McMurray[7] states that he has never seen, nor found in the literature, a report of a bilateral abscess.

It is quite natural to assume, as stressed by Brooks,[6] that such infections would occur more commonly in debilitated and undernourished children. On the contrary, I found the patient's general condition recorded as good in fifty-one instances and as poor in only twenty-one. Many of the children came from the best of healthful surroundings, where nutritional care had been all that could be desired.

ETIOLOGY

Some form of nasopharyngeal infection is commonly assumed to be the precursor of retropharyngeal abscess. Glands draining the nasopharynx would qute naturally, at times, become secondarily infected in the presence of sinusitis, adenoiditis, tonsillitis and otitis media. These conditions may be primary or the result of some systemic infection such as measles or scarlet fever. Almost invariably retropharyngeal abscess is preceded by a varying period of illness not directly attributable to the abscess itself. In table 1 are listed the principal previous illnesses which antedated the development of the abscess.

Eight per cent of Guthrie's[3] twenty cases occurred in May, June and July, tending to refute the idea that this is necessarily a winter disease. However, from this list it is quite apparent that some one of the more common manifestations of infection of the upper respiratory tract is by far the most frequent precursor of retropharyngeal abscess and that the latter is a potential complication, particularly in infants. It will be noted that by far the outstanding condition preliminary to the abscess formation was some form of cervical adenitis, either drained or undrained. Next in frequency was the common cold, then sore throats or tonsillitis, and then otitis media. The direct relationship of any of these infections to the retropharyngeal abscess is an important question and much has been written about the lymphatic drainage in this connection. Almost any form of pharyngeal or throat infection can light up infection in the retropharyngeal glands, which serve as points of drainage under these conditions.

TABLE 1

PREVIOUS ILLNESS

Sore throat	22
Otitis media	21
Cervical adenitis	46
	(previously incised 8)
Head colds	26
Tuberculosis	2
Unexplained fever	16
Measles	3
Nephritis	1

Waugh[8] states that retropharyngeal abscess never occurs in children who have been previously tonsillectomized, and he feels that tonsils, diseased in 80 per cent of patients with retropharyngeal abscess, are a potent cause of the infection. In my series, twenty-seven patients had undergone previous removal of tonsils and adenoids. It is possible that the same lack of protection against subsequent abscess formation would have been shown by more cases but for the fact that in this age group the operation is naturally less frequent than in the older children.

DIAGNOSIS

Of paramount importance in any pathologic condition is a correct diagnosis. Only on this basis can effective treatment be carried out, and, what is more important in a surgical lesion, inappropriate treatment avoided. In retropharyngeal abscess, diagnosis depends to some extent on a consideration of the preliminary illness but to a far greater degree on a correct interpretation of the chief complaints. That these are by no means constant and that they are complaints frequently characteristic of a number of other utterly different conditions at once introduce one of the major pitfalls encountered; namely, an erroneous diagnosis.

The major chief complaints on admission listed in the present series are shown in table 2.

TABLE 2

CHIEF COMPLAINTS

Complaint	Cases
Dyspnea (noisy breathing, snoring, cyanosis)	61
Dysphagia (regurgitation, anorexia, refusal)	59
Swollen glands	37
Stiff neck	31
Sore throat	9
Fever	27
Cough	3
Convulsions	2

By far the most common was some degree of dyspnea or dysphagia. Of the former there were sixty-one instances and of the latter fifty-nine, but the two were often combined in the same patient. The dyspnea was not necessarily always urgent in its nature but included in it a variety of lesser respiratory difficulties such as noisy breathing, snoring and evidence of some degree of nasal obstruction. True cyanosis was rarely present. Likewise the dysphagia was not always a gross difficulty in swallowing, such as one sees in true esophageal obstruction. It included regurgitation of food, a marked degree of anorexia, a tendency for the patient to refuse food although apparently hungry, and difficulty in nursing. Next in frequency (thirty-seven) was the complaint of swollen glands in the neck. This, of course, is in proportion to the preliminary history of enlarged glands before the development of the retropharyngeal abscess. Stiff neck was complained of in thirty-one instances, at times erroneously interpreted as an orthopedic condition (torticollis or cervical spine disease), less frequently as a possible meningitis. Generalized fever was a complaint in twenty-seven instances and of course was frequently combined to be present with other conditions. There were two instances of convulsions and, interestingly enough, only three instances in which cough was a chief complaint. In addition, there were rare complaints of bleeding, vomiting and voice changes. From this, one gains a very good picture of the effect produced by the classic retropharyngeal abscess, depending to a great extent on its location. When high enough up to avoid pressure against the laryngeal orifice, the complaints ranged more in the nature of difficulty in swallowing. The lower the obstruction, the more likely was the pressure on the larynx to cause dyspnea of varying severity. It was this symptom more than any other that gave an alarming aspect to the cases entering the hospital as emergencies. The instances of cervical adenitis were probably independent of the actual abscess but occurred concomitantly. Stiffness and tenderness of the neck were of course frequently due to the same cervical adenitis rather than to the retropharyngeal abscess itself. The two were often present together. While tuberculous disease of the cervical spine and attendant involvement of the retropharyngeal glands is frequently cited as a causative factor, it was relatively rare in this series. There were only four instances in which the actual abscess itself was found to contain typically tuberculous material and likewise only four in which definite generalized pulmonary or other systemic tuberculosis was recognized. The recovery of typical caseous material on incision of the posterior pharyngeal wall would of course give rise to the suspicion of tuberculosis, but most of these cases were due to some form of acute infectious disease. The matter of urgency of some form of surgical treatment on admission to the hospital was classified. In twenty-five instances the patient was recorded as being acutely ill and in twenty-five the operation of incision and drainage was classified as being required immediately.

DURATION OF SYMPTOMS

It was difficult in these cases to estimate the exact length of time during which the retropharyngeal abscess had been giving symptoms definitely attributable to its presence. The present illness merged with the previous history but, on an average, the actual symptoms due to the retropharyngeal abscess were of about four days' duration. Thus it appears that the actual abscess itself is of relatively rapid development and the effects of its presence primarily expressed by some degree of dyspnea or dysphagia come on promptly with the development of the abscess.

EXAMINATION

Of equal or greater importance in arrival at a correct diagnosis is the physical examination, and yet this very procedure, fraught as it is at times with the gravest risk if ineptly performed, has been the immediate cause of a fatality. Obviously, inspection and palpation of the throat offer the two major methods of examination. Neither can be carried out, so far as the nasopharynx is concerned, without providing an approach to the site of the lesion. As already pointed out, the latter varies tremendously from a point high on the posterior pharyngeal wall to a site so low as to be really retro-esophageal. To achieve a satisfactory examination in a struggling child under these circumstances frequently taxes all the surgeon's skill. Not palpation alone but inspection has resulted disastrously in more than one able operator's experience. The simple insertion of a tongue depressor or the opening of the mouth with a gag has on numerous occasions resulted in transient cessation of respiration and rarely in an everlasting one. Why this should be has been discussed by various authors. It is far more than a temporary obstruc-

tion to the laryngeal airway from pressure of the tongue against the swollen pharyngeal wall, since cyanosis is not an accompanying symptom and since all normal efforts at restoration of respiration have at times proved futile. McMurray[7] reports four instances of alarming collapse from examination with a tongue depressor after previous incision of the abscess, one of which ended in fatality. He has suggested an association with changes in pressure on the vagus nerve. Whatever the mechanism, it is a situation to be guarded against, and a possible calamity is best avoided by the constant remembrance before a finger is lifted in the examination that the case, regardless of the variety or character of the presenting symptoms, may be one of retropharyngeal abscess. Forewarned is forearmed. In the event of such suspicion many authors agree that the most feasible, informative and safe procedure is the insertion of a gloved finger into the pharynx, without the aid of either mouth gag or tongue depressor. Palpation is far more informative than inspection, particularly in the low situated form of abscess. Lloyd[9] stresses the finger as the final diagnostic criterion and says that "palpation of the posterior pharyngeal wall is important even though it incurs the noisy wrath of the infant and the silent reproach of the parents." The gag reflex will take care of any trauma to the examiner's finger, and with reasonable gentleness accidental rupture of the abscess is unlikely.

The characteristic, elastic, tense feeling on palpation of the abscess is unlike anything else felt in the pharynx. The extent of the swelling can be determined without in any way impinging on the tongue or larynx.

In addition to these measures, except in cases of dire urgency, routine use should be made of a lateral roentgenogram of the neck. In twenty instances in the present series this procedure revealed a definite enlargement of the retropharyngeal space and encroachment on the pharyngeal or esophageal lumen. I cannot stress too strongly the value of this procedure and am conscious that in one instance in which it was omitted an erroneous diagnosis and the ensuing fatality might have been avoided.

DIAGNOSTIC ERRORS

Failure, first of all, to suspect the possibility of a retropharyngeal abscess, secondly, to interpret correctly its symptoms and, thirdly, to make the proper physical examination constitutes the first great factor in subsequent complications or even fatalities. Such a failure is not by any means always reprehensible, particularly when the case is seen in its earlier stages before the signs of abscess formation are full blown. Its possibility, however, can always be borne in mind. Greenwald and Messeloff[4] state that in their experience retropharyngeal abscess escapes recognition more frequently than any other acute disease in childhood. None of their cases came to them with this diagnosis but had been treated for from one to three weeks with no suspicion of the correct diagnosis. It is only fair, however, to state that the majority of these cases had not been seen by a laryngologist, who would naturally be more likely to detect the presence of such an abscess.

Table 3 depicts the various incorrect diagnoses made in the present series.

TABLE 3

ERRONEOUS DIAGNOSES

Diagnosis	Cases
Mumps	2
Pneumonia and bronchitis	5
Tonsillitis	5
Laryngeal obstruction	2
Peritonsillar abscess	2
Torticollis	1
Tuberculosis of the cervical spine	2
Diphtheria	5
Foreign body	1
Adenoids	0
Meningitis	3

It is at once apparent that the total number (twenty-nine) constitutes only about one sixth of the total cases, a far better showing than that just cited. Nevertheless, in no condition encountered among children is a correct diagnosis of more importance than in the case of retropharyngeal abscess. The treatment is so definite and its indications so positive and so productive of a successful outcome in the vast majority of instances that a correct diagnosis is of the utmost importance. Particularly if an erroneous diagnosis is made, efforts to pursue an incorrect form of treatment may eventuate in the most disastrous results. Such a diagnosis, however, is by no means easy, primarily because symptoms of retropharyngeal abscess can so frequently simulate other conditions. The various forms of respiratory obstruction from a slight snorting or snuffling to severe dyspnea, the difficulties in connection with dysphagia, refusal of food, choking, regurgitation and the like, and particularly the effect of the abscess on the mobility of the head and neck can all be so characteristic of a wide range of other conditions as to make this diagnosis exceedingly difficult in many instances. One fact, however, stands out in my mind above all others; namely, that so long as the examining physician retains the possibility of retropharyngeal abscess in his mind as a cause for any one of these varying symptoms and rules it out in the approved and proper technic, he is likely to make but few errors. It goes without saying that in many instances the dyspnea will be due to true laryngeal obstruction, to diphtheria, to some external tracheal compression or to a possible foreign body. The difficulty in

swallowing will frequently be due to some digestive disturbance or to some acute throat infection, such as tonsillitis or peritonsillitis. The difficult movement of the head will at times be due to some disturbance in the cervical spine or to a torticollis or, if retraction of the head is the presenting symptom, to a meningitis. However, retropharyngeal abscess must be kept in mind as a possible explanation for any one of these symptoms and its presence ruled out by inspection, palpation or x-ray examination. It may not be the diagnosis at hand, but its possibility must ever be in the physician's mind. Mention of these errors is not in any way intended to cast aspersions on the diagnostic acumen of the examining physician, usually a pediatrician, but simply to call attention to the various deceptive signs and symptoms which this one single condition can present. In two instances mumps was suspected, in five pneumonia, in five acute tonsillitis, in two laryngeal obstruction, in two peritonsillar abscess, in one acute torticollis, in two tuberculosis of the cervical spine, in five laryngeal diphtheria, in one foreign body in the larynx and in three instances some form of meningitis. All these diseases were thus simulated in their most characteristic appearance by retropharyngeal abscess to such an extent that the patients were referred to the hospital with these diagnoses. Strangely enough, in not one instance was the condition thought to be due to hypertrophied adenoids. When one considers the type of respiratory obstruction which a markedly enlarged adenoid can produce, particularly in respect to the nasal quality of the voice and the difficulty of free nasal breathing, it is rather interesting to find that none of these cases of retropharyngeal abscess were referred with this common diagnosis. A word should be said as to peritonsillar abscess; particularly among a house staff whose experience in throat infections is necessarily relatively limited, it is a common occurrence to hear of a case of peritonsillar abscess in a child. Actually, true peritonsillar abscess or so-called quinsy sore throat is extremely rare in children. A condition thus erroneously diagnosed is far more likely to be due to a retropharyngeal or lateral pharyngeal abscess, lying directly behind the posterior pillar, bulging forward and in this manner pushing the tonsil forward in such a way as to cause it to appear unduly prominent and to this extent to distort the soft palate. Examination of the throat, however, through a mouth far more widely opened than is possible in a case of peritonsillar abscess, will at once reveal the difference. There is entire lack of the edematous and hyperemic congestion of the soft palate surrounding the tonsil, and the painful swallowing and trismus so characteristic of the one condition are entirely absent in the other. Only the prominence of the palate and tonsil on the affected side simulates a peritonsillar abscess. When one considers the diversity of treatments indicated in these varying conditions, it is at once apparent that such errors may lead to dire consequences if, in the presence of a retropharyngeal abscess, appropriate treatment is not applied; hence a tracheotomy for supposed laryngeal obstruction is a poor form of therapy for an abscess that requires only a careful and accurate incision to relieve the entire picture. Appropriate treatment for various orthopedic conditions will avail but little if they are not present. The desperate remedies required for true meningitis are quite out of place when the head retraction can be readily relieved by incising a retropharyngeal abscess.

SURGICAL PROCEDURES

The primary consideration in the surgical treatment of retropharyngeal abscess is drainage, accomplished by an incision, internally through the posterior pharyngeal wall or externally through the soft tissues of the neck. Occasionally, as occurred in five of the cases here reported, spontaneous rupture of the abscess occurred, constituting at times a reflection on the failure to appreciate the urgent necessity for surgical drainage. While adequate release of pus is thus usually afforded, such a rupture carries with it some risk of sudden flooding of the larynx and aspiration of infected material, which has occasionally resulted in a fatality. Myerson[10] reported a case of an infant of 8 months in whom sudden cyanosis and respiratory obstruction due to rupture of an unsuspected abscess required emergency tracheotomy to permit aspiration of the trachea. Hastings, in the discussion of an article by Barlow,[11] records the performance of emergency tracheotomy for obstruction, subsequently relieved by spontaneous rupture of the abscess. In both instances there is illustrated the fundamental importance of making a correct diagnosis, thus forestalling the necessity of these emergency measures.

Table 4 lists the operative procedures in this group of patients.

TABLE 4

SURGICAL TREATMENT

Incision (pharyngeal)	135
External incision	2
Previous incision	5
Transtonsil incision	2

It will be noted that simple pharyngeal incision was carried out in 83 per cent of the cases. In five instances the abscess had been previously incised before entrance of the patient into the hospital. It is startling to note that within this small group there were no less than four fatalities. While the previous incision cannot be in any way directly associated with this startling

mortality, it does raise an important question; namely, that of premature incision before definite localization has occurred. Numerous authors have stressed this point. Greenwald and Messeloff[4] record the case of an 8 months old infant in whom the incision into a nonfluctuant mass was followed by fatal septicemia. Certainly it is generally agreed that, barring some respiratory obstruction from tissue swelling, there is no haste in providing drainage unless pus is present. When definitely stated, there were in the present series sixty-six cases of recorded definite fluctuation on admission, while forty-one were said on admission to be nonfluctuant. Pus was recorded as obtained in eighty-nine instances and no pus on incision in fifteen, the latter mistake due clearly to an incorrect estimate of the presence of fluctuation. Incision into acutely inflamed glandular tissue is only provocative of spread of the infection. In 13 per cent of the cases no incision was required. Perhaps these cases should not be included in a discussion of retropharyngeal abscess, but, beyond the fact that actual suppuration did not occur, the cases presented classic signs of the condition. Pending the development of definite pus formation, it is advisable to treat these patients with such supportive measures as are best suited to meet the presenting symptoms. It is not to be understood that this means a neglect of definite respiratory obstruction requiring urgent treatment but in the absence of the latter, with a definite swelling of the posterior pharyngeal wall which is not yet fluctuant, much can be done by the use of hot irrigations, external poultices and the administration of intravenous fluids to maintain the patient's nutrition until such time as fluctuation appears. This develops with surprising rapidity in these cases and does not necessitate any prolonged period of delay. Premature incision, however, has been recognized as being definitely disadvantageous if not actually dangerous.

The actual technic of the operation has many variations, according to the preferences of individual operators. Consideration must first of all be given to the question of anesthesia. Should general anesthesia ever be used and if so under what circumstances? Numerous authors counsel against the use of any anesthetic at any time. Lloyd advocates a general anesthetic after the initial incision, to complete the operation by extending the incision downward to the base of the cavity, together with tonsillectomy and adenoidectomy at the same time. Certainly in any case showing the slightest signs of respiratory embarrassment, any form of anesthesia would seem to be definitely contraindicated and unjustifiable. In this series, in eighteen instances, some form of general anesthetic was administered, fourteen patients receiving ether and four gas-oxygen. In the other 144 cases no anesthetic was administered. It is my feeling that general anesthesia in these cases is to be condemned, particularly in the younger children and most assuredly in all cases in which there is the least evidence of interference with free breathing. In certain instances in the older children, when the swelling is not particularly large and when for some reason it is desirable to control the patient more adequately, a general anesthetic might be permissible, but there is certainly a risk involved in such administration which is of very grave importance. In one instance in this series, when ether was administered there was transient, alarming cessation of respiration, and, with the relaxation of the intercostal muscles, restoration of such respiration is notoriously difficult. In another case, an emergency tracheotomy was necessary because of cessation of respiration at the outset with ether administration. The congestion of the cervical circulation incident to the administration of gas, even when combined with oxygen, is such as to make it a most undesirable anesthetic for any of these cases. Any patient can be restrained for purposes of operation just as readily as can a patient for direct laryngoscopy, for which Jackson has always counseled against general anesthetic administration. Loss of laryngeal reflexes only increases the risk of aspiration aside from the danger in the presence of dyspnea or respiratory obstruction.

The position of the patient is a factor which is divided between two schools, one of which favors the sitting or upright position, the other the prone or exaggerated prone (so-called Rose) position. In four instances in the present series, patients were operated on in the upright posture. The remainder, as far as direct mention was made of the position, were operated on in the prone or exaggerated prone, so-called Rose, position. Possibly when no mention was made of the position there may have been additional instances of the sitting posture. It was formerly the custom to operate on most of these patients in the sitting position by reaching backward over the tongue with the left index finger, palpating the abscess and then inserting a knife into the anterior abscess wall blindly and following incision by immediate reversal of the position of the patient in order to prevent aspiration of septic secretions. More and more this position has given way to the prone, in which the head is extended and direct inspection afforded of the posterior pharyngeal wall, either by the use directly of a laryngoscope, as advocated by Tucker, or by the use, as favored by me, of an angulated tongue depressor which elevates the tongue and epiglottis and by reflected light affords a good view of the posterior pharyngeal wall with its attendant swelling. Thus, under direct vision, the most prominent and bulging portion of the abscess can be incised, its con-

tents noted and the latter slowly aspirated under complete control, the laryngeal level being above that of the abscess and thus preventing aspiration of secretions. At the same time, this direct inspection affords a view of the larynx and pharynx and thus enables the operator to detect a possible foreign body which might have been heretofore unsuspected. Subsequent stretching of the edges of the wound is afforded in the same manner without any appreciable loss of secretion into the laryngeal orifice. Likewise, there is avoided the necessity for any sudden shifting of the patient's position, and the whole process is done under direct vision.

Some authors have advocated the preliminary insertion of a bronchoscope in order to assure an unobstructed airway. In my experience this procedure is an increasing complication and, in those instances in which the protruding pharyngeal wall tends to overhang the laryngeal orifice, almost a physical impossibility.

EXTERNAL DRAINAGE

In only two instances in this series was external drainage carried out. In both instances the patients died, though death was in neither directly attributable to this form of approach. The external incision has been advocated for those abscesses which are secondary to tuberculous infection of the spine. Babbitt,[2] in his summary of fifty cases, concludes that the external route should be more frequently employed in evacuating abscesses complicated by cervical adenitis. Certainly when it is felt that the cervical swelling is directly connected and continuous with the pharyngeal swelling, as is sometimes the case, external drainage would seem to be the procedure of choice. If, however, the cervical swelling is a secondary and independent adenitis (by far the commonest situation), it is hard to see how external drainage for the purpose of reaching a retropharyngeal abscess could be anything but a risky and complicated procedure.

Kistler[12] divides these abscesses into intrapharyngeal and extrapharyngeal. The former result from spread of infection into the lateral wall of the pharynx. Extrapharyngeal abscesses result from inflammatory changes in the deep cervical glands leading to secondary abscess in the deepest gland of the set lying against the pharyngeal wall. Consequently the lateral pharyngeal wall is pushed medially by a fluctuating swelling which bulges into the cavity of the pharynx on one side. He feels that intrapharyngeal abscesses should be opened by incision from within and extrapharyngeal abscesses by external operation through the tissues of the neck. This extrapharyngeal abscess would appear to be really an abscess in the pharyngomaxillary fossa and as such is not really within the group commonly called retropharyngeal. Rarely do they present to any real extent in the pharyngeal wall but far more frequently produce a degree of external swelling, which is frequently best handled by external incision by the methods of Mosher or Batson. I feel that only rarely is external incision advisable in true retropharyngeal abscess, even when the abscess is so deeply located as to be almost retroesophageal. The intrapharyngeal drainage tract is far more direct and far less likely to become obstructed.

In two instances drainage was carried out directly through the tonsil fossa after preliminary tonsillectomy. Such an abscess is really retrotonsillar and yet is in no sense a true peritonsillar abscess. It has all the characteristics of a retropharyngeal abscess except for its extreme lateral position, and yet is not so deeply located as a true pharyngomaxillary fossa abscess.

In this connection, mention should be made of a type of abscess seen most commonly in children, almost exclusively males, in which a swelling appears high on the pharyngeal wall directly behind the posterior pillar. Its development is slow, accompanied often by high fever. The symptoms are those of mild dysphagia, never of any appreciable dyspnea, and the swelling frequently subsides without ever attaining to frank pus formation or abscess, the definite development of which should always be awaited before any attempt at drainage.

COMPLICATIONS

In 115 of these cases the outcome was recorded as uneventful. By this is meant that, following incision and drainage and presumably the recovery of pus and evacuation of the abscess, all signs and symptoms of respiratory obstruction, dysphagia, fever and other evidences of the effect of the abscess, subsided in a relatively prompt fashion. This may have been within the ensuing two to three days or possibly somewhat longer. Occasional recrudescences of fever were present, rarely requiring subsequent incision of the abscess cavity. It is these cases which give rise to the notation so frequently seen on the record that the abscess was "opened and drained in the routine manner." Such cases give no cause for anxiety but doubtless their successful outcome depended primarily on a prompt and accurate diagnosis and careful and correct incision and drainage performed with the least possible risk to the patient. On the other hand, in forty-seven instances the outcome was in some way complicated by one or more of the conditions listed in table 5.

There were four instances of tracheotomy, eight instances of prolonged sepsis, fourteen instances in which supplementary or secondary incision into the abscess cavity was deemed advisable, eight instances in which secondary incision of infected cervical glands was necessary,

twelve instances of prolonged fever following incision in which, for some reason or other, the temperature failed to return to normal, three instances of severe hemorrhage and finally seventeen cases of so-called late complications such as meningismus, pneumonitis, otitis media, sinusitis, scarlet fever or unexplained cough. Of these complications, certain ones do not require any special mention. It is obvious that if the cervical adenitis developed into abscess formation it would, in the natural course of events, require incision in its own right. The late complications could in no definite way be attributable to the abscess itself or to its drainage and might, of course, have supervened in any case, perhaps, still more probably, in a patient who had recently undergone an infection such as retropharyngeal abscess.

TABLE 5

COMPLICATIONS

Tracheotomy	4
Sepsis	8
Supplementary incision	14
Incision of cervical glands	8
Prolonged fever	12
Hemorrhage	3
Late complications	17

Tracheotomy cannot properly be called a complication, but the fact that the operation was performed undeniably constitutes a complication and hence it is here so listed. As several authors have pointed out, the procedure should, theoretically, never be necessary. If alarming dyspnea is present, the prime indication is drainage of the abscess, which will at once relieve the obstruction. Almost always tracheotomy enters the picture because the diagnosis of retropharyngeal abscess has not been made in time. Rarely so much edema of the pharyngeal tissues has occurred as to cause laryngeal obstruction even after evacuation of the abscess, but this is most exceptional.

In the present series, four tracheotomies were performed, in three instances in the face of a correct diagnosis and in one in which the abscess was unsuspected. In two instances the patient died and in the other two he was cured. In one instance the injudicious use of a general anesthetic could be traced directly as the cause of a necessary tracheotomy. It is under these circumstances that a correct diagnosis is of the utmost importance in determining the cause of apparent laryngeal obstruction and of always remembering retropharyngeal abscess as a possibility.

Supplementary incision was required, as already stated, in fourteen instances. Thus, in the vast majority of cases a single adequate incision into the abscess cavity, with the edges of the wound well spread apart with a hemostat, was sufficient to provide adequate drainage. It is true, however, that occasionally the wound edges become sealed together in such a way as to impair drainage, and these edges must be separated in order to reestablish drainage. Such secondary separation is a simple matter but obviously requires that an eye be kept on the wound until it is evident that all the infection has subsided, a result which normally takes place quite rapidly following the initial evacuation.

Prolonged fever and sepsis went more or less hand in hand, although the two were not necessarily parallel. Whether the sepsis could be viewed as a direct result of the retropharyngeal abscess is, of course, a most difficult matter to decide. The gland itself may have been simply a part of a general septicemia and is by no means to be regarded as its focus. Such sepsis, it will be noted in the summary of the deaths, was responsible for three fatalities. In the other instances, after a more or less prolonged and stormy course, at times with metastatic abscess formation, the patient recovered. It is quite probable that, under these circumstances, the actual abscess itself was but an incident in the entire septic picture. In the three instances of hemorrhage there was a mortality of 66 per cent. These hemorrhages will be discussed as a separate item.

It appears, then, that almost one fourth of the total number of patients suffered some form of complication. This is distinctly in contrast with the general feeling that the condition of retropharyngeal abscess is of little moment and a source of no special anxiety.

HEMORRHAGE

Severe, sudden and often recurrent profuse hemorrhage has been one of the most dreaded complications of retropharyngeal abscess. Numerous cases have been reported by various authors, all of whom agree that, in the presence of typical pharyngeal hemorrhage, ligation of the common carotid artery is the one and only procedure likely to be of any avail. In the present series (table 6) there were three instances of such hemorrhage, two of which proved fatal.

In two cases there was ample warning to indicate that bleeding was taking place in or around the carotid artery. In one of these, ligation was carried out after two preliminary warning hemorrhages; in the other the procedure was not undertaken and a final severe hemorrhage caused the death of the patient. In the other instance, following external drainage, there was a single, sudden profuse hemorrhage, so severe as to occasion death within sixty seconds, affording absolutely no opportunity for ligation. In most cases recorded in the literature some preliminary bleeding occurred as a warning of the necessity of drastic measures,

and ligation under these circumstances is imperative. In all probability it would have saved the third patient in this series. In the patient treated by ligation, a ligature was placed about the common carotid artery with apparent success. This procedure, however, was followed by subsequent bleeding, presumably from blood flowing down the external carotid and up the internal above the point of ligation on the common carotid artery. This secondary source of bleeding is well recognized and it is agreed that common carotid ligation must be accompanied by external carotid ligation if it is essential to prevent this return flow with possible subsequent bleeding. This, however, cuts off still more completely the cerebral circulation, while common carotid ligation alone, if sufficient to control the bleeding, does not entirely deprive this portion of the brain of its blood supply. In this instance a secondary procedure was carried out in which ligatures were placed about both the internal and the external carotid and brought to the surface with a view to ligating one or the other, provided future bleeding occurred. Since this did not result, neither of these vessels was finally ligated, permitting some cerebral circulation to take place in this retrograde manner. In view of the extent of many of these retropharyngeal suppurations, it is rather remarkable that such bleeding is not more common, though the ability of the arterial wall to protect itself against infection, even when directly adjacent to suppuration, is well known. When such bleeding is apt to occur and what type of abscess one might expect it in is quite uncertain and can never be predicted. Certainly one should always bear it in mind as a possible complication and, above all, if given sufficient warning by preliminary but not fatal hemorrhage to undertake ligation before it is too late. It is not always the carotid artery that bleeds. In one of my cases the vertebral artery was involved, and Baum[13] mentions a case of fatal hemorrhage, presumably from the vertebral artery, in which carotid ligation was of no avail. Lifschutz[14] found twenty-three cases of serious retropharyngeal hemorrhage, with nineteen deaths. Of the four recoveries, three occurred following common carotid ligation and one without.

An analysis of the twelve deaths in this series (table 7) gives a mortality of 7.4 per cent. Death following this condition is, as in many other instances, a direct challenge to the surgeon as to how such fatal complications may be avoided. Obviously it is of importance to make the correct diagnosis and of almost equal importance to carry out the appropriate treatment with the minimum amount of trauma and the greatest amount of skill. An analysis of fatalities should and frequently does yield information that should be of help in avoiding subsequent ones. In this series there is no real uniformity of age among the fatal cases. Two of them were the result of hemorrhage and have already been discussed. In four the incision and drainage of the abscess was followed by a generalized septicemia, in which it was difficult to discover any etiologic factor. It is doubtful here whether the local treatment had any special bearing on the matter but, as has already been pointed out, in three of these instances preliminary incision had been attempted before entrance to the hospital, suggesting the possibility that premature incision may result in a spreading of the infection beyond the natural boundaries built up by nature in an effort to localize the abscess. In one instance death followed two months after external drainage of a particularly deep seated abscess as a result of mediastinal infection. There was a possibility of premature removal of the drain, resulting in a downward extension of this infection, and the surgeon was left with a feeling that it might have been preferable to have drained even this deep seated abscess from inside rather than through the external route. In two instances sudden death occurred on the preliminary examination of the patient: in one instance merely by the insertion of a mouth gag and in the second on insertion of a laryngoscope to rule out laryngeal diphtheria. The question of the sudden death on local examination of the throat, fatalities from which have been reported by various other authors, constitutes a most perplexing problem. Death has been ascribed as due

TABLE 6

HEMORRHAGE

Name	Lesion	Symptoms	Treatment	Result
P. M.	Left retropharyngeal	Repeated hemorrhage from pharynx and left ear	Ligation, common carotid; transfusions	Cured
J. M.	Left retropharyngeal	Sudden profuse hemorrhage, vertebral	External incision and drainage	Died
O. W.	Right retropharyngeal	Repeated hemorrhages, internal carotid	Incision and drainage; packing; transfusions	Died

to pressure of the jaw or tongue against the pharyngeal wall; but there must be more than a mere shutting off of the laryngeal airway, since the death appears to be one of collapse and suspension of circulatory function rather than of asphyxia. The heart ceases to beat and no efforts of resuscitation have proved of avail in this particular class of case. Others have suggested a disturbance of the vagus center with resulting cardiac paralysis or some other neurocirculatory disturbance the exact nature of which cannot be ascertained. Suffice it to say that one must always bear in mind, in examination of these patients, the possibility of such a sudden cardiac collapse and at least guard against anything that tends in any way to cause pressure against the pharyngeal wall. For this reason the method advocated by the writer and others of operating in the prone position and elevating the tongue and larynx with a tongue depressor or laryngoscope would appear, in general, to be the safest method of handling these cases. In two instances death occurred several hours after evacuation of the abscess where, so far as those in attendance could tell, there was no cause for apprehension and convalescence appeared to be well under way. That the death is far from one of violence or suffocation is manifest by the fact that in one instance the child died in the presence of its mother at the bedside without the latter being aware of the fatality until a nurse came in to examine the child.

TABLE 7

DEATHS

	Name	Age	Chief Symptom	Operation	Time from Operation to Death	Cause of Death	Other Observations
1.	O. W.	4 yrs.	Hemorrhage	Incision and drainage	4 days	Hemorrhage	Sudden uncontrolled bleeding, carotid
2.	P. A.	1 yr.	Dyspnea	Laryngoscopy	5 min.	Asphyxia	Sudden death on preliminary examination
3.	T. S.	4 mos.	Dyspnea, dysphagia	Spontaneous rupture	3 hrs.	Respiratory failure	Died few hours after spontaneous rupture
4.	L. R.	10 mos.	Fever	Incision and drainage	2 wks.	Pyemia	Development of general sepsis
5.	S. C.	6 mos.	Dyspnea	Incision and drainage	4 days	?	Sudden death; cause unknown
6.	P. P.	3½ mos.	Dyspnea	Incision and drainage	1½ hrs.	?	Died in bed; mother unaware of death
7.	F. T.	4 yrs.	Dyspnea	External incision and drainage; tracheotomy	4 wks.	Mediastinitis	Sepsis following external drainage
8.	D. S.	14 mos.	Cyanosis	Laryngoscopy	5 min.	Respiratory failure	Sudden death on laryngoscopic examination
9.	C. S.	1 yr.	Fever	Incision and drainage	5 wks.	Septicemia	.....
10.	J. M.	4 yrs.	Dysphagia	External incision and drainage	5 days	Hemorrhage	Sudden spontaneous rupture of vertebral artery
11.	W. N.	15 mos.	Dysphagia	Incision and drainage	7 days	Septicemia	Sudden cyanosis and death; + culture
12.	R. V.	2 yrs. 10 mos.	Fever	Previous incision and drainage; no operation	3 days	Septicemia	Acutely ill; comatose; good drainage

Death from spontaneous rupture of the abscess and sudden flooding of the larynx, as reported by one author, was not apparent in any of our cases.

In general, retropharyngeal abscess must be recognized as a condition carrying potential risks and demanding, first of all, prompt recognition and, secondly, adequate treatment at an appropriate time, with all possible care in providing adequate drainage to the abscess cavity.

It is interesting to note that in this entire series there is no record that retropharnygeal abscess developed as a late or even early complication of adenoidectomy. Attention to this fact has been called by Dixon,[15] who explains it on the basis that the excellent drainage af-

forded by the open pharyngeal wound does not permit the sealing in or walling off of infection. Likewise, retropharyngeal abscess as a complication of tonsillectomy was not recorded in this series.

CONCLUSIONS

1. Retropharyngeal abscess, commonly regarded as a condition of no special surgical risk, still carries an average mortality of 7.4 per cent.

2. Only the constant consideration of retropharyngeal abscess as a possible explanation for a wide range of symptoms will prevent diagnostic errors.

3. Careful digital palpation of the pharyngeal wall is preferable to the use of a tongue depressor or mouth gag.

4. Pharyngeal incision, without anesthesia and in the prone position, will suffice to secure drainage in almost all cases.

5. Sudden severe hemorrhage must at once be controlled by carotid ligation.

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RÉSUMÉ OF COMMUNICABLE DISEASES IN MASSACHUSETTS FOR OCTOBER, 1936

Disease	Oct., 1936	Oct., 1935	5-Yr. Average*
Anterior Poliomyelitis	11	235	101
Chickenpox	330	351	311
Diphtheria	16	33	103
Dog Bite	718	804	451
Epidemic Cerebrospinal Meningitis	6	13	7
German Measles	38	39	32
Gonorrhea	567	595	626
Lobar Pneumonia	227	259	203
Measles	254	179	161
Mumps	247	333	220
Scarlet Fever	362	551	468
Syphilis	466	511	401
Tuberculosis, Pulmonary	286	303	303
Tuberculosis, Other Forms	30	41	38
Typhoid Fever	8	13	22
Undulant Fever	6	8	2
Whooping Cough	667	286	392

*Based on figures for preceding five years.

RARE DISEASES

Anterior poliomyelitis was reported from Cambridge, 1; Lowell, 2; Milford, 1; New Bedford, 2; North Brookfield, 2; Quincy, 1; Taunton, 1; Worcester, 1; total, 11.

Diphtheria was reported from Boston, 1; Canton, 1; Chicopee, 1; Everett, 1; Fall River, 1; Lexington, 1; Lowell, 1; New Bedford, 3; Salem, 2; Stoughton, 1; Wareham, 1; Worcester, 2; total, 16.

Dysentery, bacillary, was reported from New Bedford, 3; Stockbridge, 1; total, 4.

Epidemic cerebrospinal meningitis was reported from Berlin, 1; Boston, 1; Holyoke, 1; Malden, 1; North Attleboro, 1; Weymouth, 1; total, 6.

Malaria was reported from Newton, 2.

Paratyphoid fever was reported from Cambridge, 1.

Pellagra was reported from Boston, 1.

Septic sore throat was reported from Amesbury, 1; Boston, 3; Lynn, 1; Somerset, 1; total, 6.

Tetanus was reported from Fall River, 1.

Trichinosis was reported from Boston, 1; Brookline, 1; Haverhill, 1; Wakefield, 1; total, 4.

Typhoid fever was reported from Avon, 1; Bellingham, 1; Billerica, 1; Chelsea, 1; Lincoln, 1; New Bedford, 1; Pittsfield, 1; Springfield, 1; total, 8.

Undulant fever was reported from Attleboro, 1; Dalton, 1; Northampton, 1; Norton, 1; Pittsfield, 1; Williamstown, 1; total, 6.

Both for October and this year to date, reported cases of diphtheria and pulmonary tuberculosis reached an all-time record low figure.

This year to date, the reported cases of poliomyelitis reached a record low figure, despite the better diagnosis of this disease.

Typhoid fever had the lowest reported October incidence ever recorded.

The unusually low incidence of reported scarlet fever cases continues for the third consecutive month.

The reported incidence of lobar pneumonia continues higher than the five-year average. For the first time this year there was an appreciable decline in the monthly figures of 1936 as compared with 1935.

Undulant fever to date continues to be reported above last year's record high figure.

Whooping cough, measles, and mumps continue above the five-year average.

The reported incidence of cerebrospinal meningitis, chickenpox, German measles, and tuberculosis (other forms) was not remarkable.

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 22501

PRESENTATION OF CASE

A 53 year old American salesman was admitted complaining of abdominal pain and chills.

Four days before entry he seemed lacking in energy and at two o'clock the following morning he was awakened with a severe shaking chill. Shortly afterward he became nauseated, vomited, and complained of severe headache. He had a gnawing nonradiating pain across the midabdomen throughout the following day. A physician gave him some pills and shortly afterward the patient began to have frequent watery stools. Headache and pain in the abdomen continued and he was unable to sleep. Further medication caused the diarrhea to cease but he became quite weak and had another chill shortly before entry, at which time his temperature rose to 104.5°. The skin was thought to be slightly jaundiced during this illness.

The patient's condition was such that no definite past history was obtainable. The wife, however, stated that he had complained of symptoms suggestive of ulcer but the character of these was not noted. An appendectomy for acute appendicitis was performed four years ago. His wife also stated that the patient had been very apprehensive for many years and had had various complaints. This illness, however, was the first of its kind. Two years before entry x-rays of the stomach were negative. A month before entry, x-rays of the chest were likewise said to be negative.

Physical examination showed a small, poorly nourished man with a dry icteric skin. The face was flushed. The lungs were clear. The heart was normal. The blood pressure was 110/75. There were tenderness and spasm in the right upper quadrant. A questionable mass was palpated beneath the right costal margin.

The temperature was 100°, the pulse 100. The respirations were 24.

Examination of the urine showed a specific gravity of 1.020 with a trace of albumin and a small amount of bile. The sediment was negative. The blood showed a white cell count of 16,800, 94 per cent polymorphonuclears. The stools were negative for amebae but gave a moderately strong reaction to the guaiac test. A van den Bergh test showed 3.8 milligrams bilirubin. The blood chlorides were 106 cubic centimeters.

On the second hospital day the patient had a mild chill associated with an asthmatic attack during which squeaking râles and prolonged expiration were noted. There was no chattering of the teeth and rigor appeared to be voluntary. There was slight cyanosis of the lips and nail beds. The pulse was 140, the temperature 100°. The patient was given 1/100 grain of atropin and his symptoms disappeared in five minutes. The abdominal pain previously described was slightly relieved following the administration of morphin but the jaundice persisted, the van den Bergh increased to 5 milligrams, and the white blood cell to 19,000.

On the third hospital day a laparotomy was performed. Shortly after the administration of the spinal analgesic the patient had a chill. The abdomen contained no excess fluid. The gallbladder was collapsed and there were no palpable stones in it. The pancreas was normal to palpation. A portion of the stomach and duodenum was visualized and was not remarkable. There was moderate general enlargement of the liver which was smooth, soft and otherwise normal in appearance. The common duct was moderately adherent to the structures around it. This was opened and a small amount of bile expressed. Subsequently the duct remained perfectly dry except at the time when a probe was inserted up the hepatic duct. A small needle was inserted into the portal vein and a free flow of blood obtained. Cultures of the gallbladder contents and portal vein blood showed no growth.

Shortly after operation the temperature rose to 104° and dulness with bronchial breathing was elicited in the right upper chest. An x-ray showed linear hazy bands of dulness throughout the upper half of the chest. The heart shadow was not displaced. The diaphragm was normal in position and outline. The patient became progressively worse and died on the sixth hospital day, 4 days postoperatively.

DIFFERENTIAL DIAGNOSIS

DR. RICHARD H. SWEET: Here we have a man who is 53 years old, a salesman, who presumably lived in this country all his life. His chief complaint is of abdominal pain and chills. We find on reading the history that the pain did not precede the chills, because it says here that four days before he came into the hospital he simply did not feel well and then at two o'clock on the following morning he was suddenly awakened by a shaking chill. No mention is

made of preceding pain. Shortly after this he had nausea, vomiting and headache. All of this goes with the onset of any severe infection. Then it mentions that he had, following that, a gnawing nonradiating pain across the midabdomen. This happened the following day, a considerable time after the onset of the symptoms. I do not know whether we should assume that he was given a cathartic. Perhaps he was, or perhaps the diarrhea that he had went along with the disease.

From the past history we obtain little which is of any value in making a diagnosis, only that he had had some abdominal symptoms that the man who took the history interpreted as being suggestive of ulcer. The definite character of these symptoms was not noted.

We do not know why the x-rays of the chest were taken. If we could be sure he had a mass in his upper abdomen we might assume on the basis of his history that he had acute cholecystitis with a palpable gallbladder. The temperature is a little low considering the severity of his illness. No mention is made of eosinophilia.

We discover on reading further that they decided to operate on this patient and I wish for my peace of mind that they had not, because up to this point we might have made a diagnosis. After we read the surgeon's note we decide that there is something entirely different from what they expected to find. I imagine that the surgeon expected to find an acute gallbladder. There is no mention as to whether the common duct was dilated. I think presumably that it was not, because apparently he had a normal biliary tract, the gallbladder having been normal as well. One does not usually have to express bile from the common duct after it is opened; it usually runs out quite freely. So we have to explain this common duct obstruction which he had above the level of the cystic duct. Apparently the surgeon was puzzled by the diagnosis and inserted a needle into the portal vein. He might have done that to identify the common duct. Of course, in cases where it is difficult to identify the duct we use the needle to be sure; but it appears that a sample of blood was obtained from the portal vein for culture. If we assume that is the case the surgeon must have thought he was dealing with pylephlebitis of the liver or portal vein obstruction. Cultures, however, were negative.

X-ray Interpretation

Dr. George W. Holmes: These portable films were taken with the film behind the patient's back and there is a certain amount of rotation. The clavicle is shortened on the right side as compared with the left, so that displacement of the heart and narrowing of the right side of the chest are in part due to the position in which the films were taken, but I think there is some actual displacement of the mediastinal contents toward the right, which would mean that for some reason the lung on that side did not expand fully. We have a history of a film taken a month previously in which the chest was said to be normal. If we can rely on that we can rule out any chronic fibrosing process in the lung producing this picture and we would have to attribute it to collapse following operation or to an acute infection of some sort. If we went by the films alone it would be very difficult to rule out an old tuberculosis. His heart is not increased in size and his aorta as far as I can make out is normal but it is, of course, hidden to some extent by this mediastinal shadow.

Further Differential Diagnosis

Dr. Sweet: This case puzzled me so much that before the meeting I took a few moments to jot down a few things in two columns for and against two or three diagnoses. I think there is something to be said for a diagnosis of infection of the liver by means of the portal vein; in other words, a pylephlebitis of the liver. It is not at all unusual to see pylephlebitis of the liver without any recognizable antecedent disease although there is usually an obvious course of infection. We have nothing here to make us suspect that he might have one. In other words, there is no history of acute appendicitis or other infection in the area which the portal vein drains. Then of course we have a negative culture from the portal vein which may or may not mean something. The increasing jaundice is rather interesting. We may of course have a degree of jaundice in pylephlebitis but it is usually slight. Here it seems to be increasing and rather tends to make us think there was obstruction in the common duct. Of course there are many things here that might go with pylephlebitis, such as repeated chills, intermittent fever, slight jaundice, and diarrhea.

How about liver abscess? Apparently the medical service thought about liver abscess, at least amebic abscess of the liver, because they made a note that no amebae were found in the stools. Liver abscess may be associated with repeated chills but frequently there is only one chill at the onset and repeated chills only if there is a spread of infection from the primary abscess. That may or may not be of some help. I think of more assistance is the fact that there is no elevation of the diaphragm which we usually see with abscess of the liver. The liver on the other hand was swollen at the time of operation. Here again we have no suggestion of etiology for liver abscess. If we exclude liver abscess and pylephlebitis we must come down to a diagnosis of an acute cholangitis with either associated obstruction of the

common duct, resulting from swelling and inflammation, or possibly cholangitis superimposed on some slowly developing obstruction of the common duct, such as might be produced by carcinoma located about the cystic duct. Certainly he could have repeated chills and fever with jaundice, with swollen liver, all from acute cholangitis. The operator made a note that there were some adhesions about the common duct which might mean an acute infection, and there was apparently a large degree of obstruction of the common duct above the cystic duct and none apparently below at the time of the operation, which would seem to indicate that there was a localized area of obstruction, or possibly that the radicles in the liver were blocked off. It seems to me that it is obvious that the infection is in the liver; whether it is confined entirely to the biliary radicles, I do not know. I do not know whether he had pylephlebitis or not. I should rather incline to a diagnosis of acute cholangitis and I rather suspect that there is something more than that, possibly a carcinoma with a superimposed infection although pylephlebitis cannot be ruled out.

Clinical Discussion

Dr. Edward B. Benedict: I saw this patient outside and sent him in. The history as given in the hospital record places the pain in the midabdomen, whereas my impression was that it was definitely lower abdominal at the start and only later shifted to the midabdomen. He also had loose stools before any cathartics were given and there was some tenderness in the lower abdomen. Though the thought of colitis crossed my mind I did not consider it very seriously. I did not make the correct diagnosis but I think it is quite possible to do so if you have that additional history.

Dr. Sweet: That would help a great deal in making a diagnosis of pylephlebitis. I have been looking through the history for something that might suggest acute appendicitis or other etiology for pylephlebitis.

Dr. Tracy B. Mallory: Of course, he had already had his appendix removed which ruled out the most common primary focus for pylephlebitis.

Dr. Benedict: The pain shifted eventually to the right upper quadrant. There was tenderness in that spot but no mass that we could feel.

A Physician: You have not explained the positive guaiac in the stools.

Dr. C. M. Jones: Half of the cases with deep jaundice have a positive guaiac in the stools. It has no diagnostic significance at all.

A Physician: Was a Widal done?

Dr. Mallory: No.

Clinical Diagnoses

Acute cholangitis?
Septicemia?

Dr. Richard H. Sweet's Diagnoses

Before Dr. Benedict's comment on the history: Acute cholangitis.
After Dr. Benedict's report: Acute pylephlebitis of the liver.

Anatomic Diagnoses

Acute thrombophlebitis of the portal, inferior mesenteric and superior hemorrhoidal veins.
Diverticulitis of the sigmoid with abscess formation.
Peritonitis, acute, localized.
Bronchopneumonia.
Icterus.
Nephritis, chronic vascular.
Operative wound: Cholecystostomy, choledochostomy.

Pathologic Discussion

Dr. Mallory: The postmortem examination showed a very extensive pylephlebitis. The portal radicles throughout the liver showed septic semipurulent thrombi. The main portal vein itself also showed numerous foci of thrombosis, though the thrombosis there was not complete. We were able to trace the process downward to the inferior mesenteric vein and still farther to the superior hemorrhoidal vein. Just at the junction of the sigmoid and rectum there were numerous diverticula, two of which were acutely inflamed. It then appeared evident that we were dealing with a pylephlebitis secondary to the acute diverticulitis of the sigmoid.

Dr. Arthur W. Allen: How frequently do you see that combination?

Dr. Mallory: It is a very unusual one. I do not remember that we have had another in 10 years. We have had pylephlebitis secondary to ulcerative colitis but we have not happened to have one with this combination. Whether you get it would depend in part on where the diverticulitis was. If it was low enough it would drain through the inferior hemorrhoidal vein and would not enter the portal system.

The lungs showed collapse and bronchopneumonia, nothing else.

CASE 22502

Presentation of Case

A 44 year old single Portuguese-American storekeeper entered complaining of paralysis of the left leg of seven days' duration.

During the past year the patient did not feel so well as usual but had no definite complaints

until 6 months before entry, when he had recurrent spells of gas following meals. These occurred about once a week. He had one or two attacks of abdominal cramps with moderate diarrhea containing no blood. Two and a half months before admission he caught a cold which lasted several days. There was no sore throat associated with this. Three weeks before admission following a dance he caught cold. The following day he had sharp pains in the left lower anterior chest and also in the left shoulder. This pain was aggravated by breathing and coughing. A doctor made a diagnosis of pleurisy and strapped the left chest. The patient continued to work until 1 week before admission, at which time he had some difficulty in walking home. The following morning his left leg was partially paralyzed and the right totally paralyzed. There was a sensation of pins and needles in both legs spreading up over his abdomen. On the same day he had a slight nosebleed. From that time on he remained in bed and developed some difficulty in urination and defecation. Three days before admission he developed complete urinary retention and had to be catheterized by his physician. Two days before entry he vomited after taking a senna laxative. His ankles became swollen and painful. He became incontinent of feces. He had noticed during the past 3 weeks small bruises on his left chest and upper arms. During the week before entry he developed spontaneous purpuric areas over his legs. Since the onset of the paralysis several of his stools were black and difficult to pass.

The family history is noncontributory.

He had always lived in Massachusetts. He had had two hernial repairs, the first 15 and the second 4 years before entry.

Physical examination showed a well-developed and fairly well-nourished, pale, sick man lying flat in bed. There were purpuric and ecchymotic areas over the legs and upper arms. The skin and mucous membranes were very pale. The pupils were small and slightly irregular. There were several petechial hemorrhages scattered over the buccal mucosa. There was slight tenderness over the spine in the midscapular region. The heart was not enlarged. The sounds were of fair quality. The blood pressure was 130/60. The spleen and liver were both moderately enlarged to percussion although the edges were not definitely felt. The bladder was half way to the umbilicus. The abdominal reflexes were absent. Both legs showed flaccid paralysis with very slight motion on the right side. The reflexes were equal and active.

The temperature was 101°, the pulse 111. The respirations were 35.

Examination of the urine showed a specific gravity of 1.006 to 1.008 with a very slight trace of albumin. The blood showed a red cell count of 2,240,000, a hemoglobin of 50 per cent. The white count was 15,900. The smear showed 43 per cent polymorphonuclear neutrophils, 27 per cent lymphocytes, 1 per cent eosinophils, 4 per cent myeloblasts, 18 per cent myelocytes and 7 per cent young polymorphonuclear neutrophiles. There was marked stippling of the red cells with a fair number of reticulocytes and normoblasts. One stool was tarry. A Hinton test was negative. A lumbar puncture showed clear, slightly xanthochromic fluid. The initial pressure was 175. There was no response after jugular compression on either side, but abdominal compression produced a prompt rise. After 5 cubic centimeters were removed the pressure was 120; after 10 cubic centimeters the pressure was 45. The pressure could not be read after 12 cubic centimeters had been removed. An alcohol test was positive. The total protein was 328 milligrams, the sugar 87.5 milligrams. There were no cells.

He was put on constant urinary drainage. The urine showed some blood. On the third day he was transfused. He rapidly failed and died on the seventh day.

Differential Diagnosis

Dr. Alfred Kranes: This patient presented a rather unusual and extremely interesting chain of symptoms and I am wondering whether we can fit them all into one pathological picture as they seem to involve many different systems. I think, however, that we probably can, although there are many data that we would like to know and that are not mentioned in the history. Certainly the rapidity of his paralysis was much more than one would expect with the usual types of cord tumor and suggests a very rapidly developing lesion in the central nervous system. The purpura and the blood picture as given here indicate a very profound disturbance of his bone marrow and just what relation that bears to the presenting symptoms of paralysis is a problem for further discussion. The lumbar puncture indicates almost a complete cord block. The neurological examination as we have it here is very inadequate, as no mention is made of the sensory examination, and we shall be unable to place the level and the extent of the cord lesion. I do not believe that the usual type of cord tumor could cause this disturbance of his bone marrow or the peripheral purpura. Of course it is possible that he has two diseases each independent of the other and occurring more or less simultaneously, one a cord tumor and the other a disease of his bone marrow; but I think it more likely that one diagnosis could adequately explain both processes.

This entire clinical picture can be explained by either one of two diseases, both having primary bone marrow lesions; one, acute myeloid

leukemia, the second, multiple myeloma. On the data presented here I find it very difficult to distinguish between the two. In favor of multiple myeloma is the rapidly developing cord compression which is due to one of two causes, either pathologic fracture of an involved vertebra or an infiltration of the cord with myelomatous tumor. Also we have evidence of some degree of renal insufficiency as shown by the urine concentration. However, the data presented on this point are so meager that one hardly feels justified in drawing any further conclusion about the state of the kidneys. The blood picture of course is not entirely in keeping with this diagnosis unless we assume that they were mistaken in the recognition of myelocytes and myeloblasts and that the cells listed as such might have been plasma cells. If such were the case, I think the diagnosis of myeloma would be quite justified. It would be very interesting and perhaps quite informative if an x-ray of his spine had been taken to rule out the possibility of a pathologic vertebra as well as x-rays of other parts of his skeleton to rule the possibility of myeloma in or out. The small amount of albumin in the urine would not lead one to believe that he had much Bence-Jones protein present. The other test of value which might help us in this diagnosis would have been a serum protein, of which there is no mention. There are a number of symptoms in this picture, however, which make a diagnosis of multiple myeloma less likely. In the first place purpura is unusual in this disease and much more common in the leukemias. Secondly, the blood picture, if correct, is much more in keeping with the diagnosis of acute leukemia, and thirdly, the pain in his left upper quadrant which radiated to his shoulder before entry is strongly suggestive of a splenic infarct which although quite common in the leukemias would be quite unusual in myeloma.

What about the rapidly developing paraplegia? Does leukemia explain that? I think it does. Weiss and Schwab in a recent report on central nervous system symptoms and lesions in leukemia report a rather unusually high percentage of such symptoms if looked for. In this patient it was quite obvious, and as far as the mechanism goes we have one of three possibilities (1) a fractured pathologic vertebra, (2) an infiltration of the cord with leukemic tumor tissue, and (3) a hematomyelia. I think the last possibility is rather remote inasmuch as the lumbar puncture showed a complete block which would be quite out of keeping with the hemorrhage in the spinal cord. The xanthochromic fluid does not necessarily mean that a hemorrhage has taken place. The complete block on lumbar puncture would adequately explain this finding.

All things considered I think the most logical explanation for this man's symptoms and the findings is an acute myeloid leukemia with infiltration of the spinal cord with leukemic tumor tissue and a splenic infarct as well as the other customary findings in patients dying with this disease. I cannot completely exclude multiple myeloma but I think the weight of evidence is in favor of myeloid leukemia.

Clinical Diagnosis

Myelogenous leukemia (acute) with compression of the spinal cord.

Dr. Alfred Kranes' Diagnoses

1. Acute myelogenous leukemia.
2. Multiple plasma cell myeloma.

Anatomic Diagnoses

Multiple myeloma, probably atypical plasma cell type, with metastases to the lungs and the bronchial lymph nodes.
Extramedullary myelopoiesis: liver, spleen, kidney and lymph nodes.
"Myeloma kidney."
Pyelonephritis, acute.
Cystitis, acute and chronic.
Prostatitis, acute and chronic.
Hydrothorax, right, slight.
Pulmonary emphysema.
Hemorrhage into the ileum, old.
Multiple petechiae of the legs, the pericardium, the kidneys and the colon.
Arteriosclerosis: mitral valve, moderate; aorta, slight.
Healed hernial scars, bilateral, with recurrent right inguinal hernia.

Pathologic Discussion

Dr. Tracy B. Mallory: Dr. Kranes has come to what I believe was the logical conclusion from the data which were presented to him. They were recorded exactly as they appeared in the hospital record. After the autopsy, however, I was curious as to the blood findings and succeeded in procuring one of the blood smears on which the intern's differential count had been made. I was unable to find any plasma cells but I did feel that there were many more immature red cell elements both erythroblasts and normoblasts, than he had found. That might have been of some help to Dr. Kranes in suggesting the type of anemia seen with bone marrow replacement rather than the type which is characteristic of leukemia.

The most significant finding at autopsy was a large tumor mass which involved the vertebral column from the level of the first to the fourth dorsal vertebrae. Throughout this area it almost completely replaced the bodies of the vertebrae and at its upper end it projected in-

ward to press upon the spinal cord at about the level of the first dorsal. It had also eroded through the bodies of the vertebrae and projected into the left pleural cavity involving on its way the sympathetic chain. Another tumor mass was found in the lumbar region which extended anteriorly into the retroperitoneal tissues but had not involved the spinal canal. Innumerable smaller areas of involvement were found throughout the remainder of the spine, the ribs, sternum, and even the costal cartilages. One metastasis was found in the lungs and a bronchial gland also contained tumor. The other significant findings at autopsy were moderate enlargement of the liver and spleen and very marked enlargement of the kidneys, the pair of which weighed 500 grams. There were also numerous internal evidences of the purpura which had been evident on the skin. Scattered hemorrhages were present throughout the large bowel and one area of massive hemorrhage was present in the ileum. A submucosal hemorrhage in the bladder produced an appearance suggesting a polypoid cystitis.

The microscopic examination proved of unusual interest. The tumors in the spine, the other bones and the bronchial lymph nodes were similar enough in appearance to make the assumption of a common origin a safe one. Each of the tumors, however, showed considerable variety in the cytology of the component cells. Many of these cells were more or less suggestive of plasma cells in appearance, although perfectly typical plasma cells with cart-wheel chromatin were not found. Within each of the tumor areas, however, many of the cells were much larger and showed ovoid or horseshoe-shaped nuclei containing a large nucleus but little chromatin. Multinucleated cells were very infrequent and none of the cells either in the fixed tissues or in impression smears made at the time of autopsy and stained with Wright's stain and with Goodpasture's oxidaze method showed any development of granules in the cytoplasm. It was felt, therefore, that a myelocytic type of myeloma could be safely ruled out. The sections of the liver and spleen proved quite interesting. The sinusoids were frequently dilated and contained many nucleated cells, among which myelocytes, erythroblasts, normoblasts and stem cells could be identified. Since cells of the red and white series were present in approximately equal proportions, it was felt that this represented extramedullary hematopoiesis rather than leukemic infiltration. This is a common finding in children in response to any process which produces a severe anemia but is quite uncommon in adults no matter how severe the process. It is much more apt to be seen in adults, as in this case, in the so-called myelophthisic anemias where for one reason or another hematopoiesis has been crowded out of the bone marrow. The enlargement of the kidneys proved to be due to an especially marked lesion of the type which is coming to be known as a "myeloma kidney". Some of the convoluted tubules, but a great majority of the straight tubules, were filled with unusually large and dense hyaline casts. That these were different from ordinary casts, however, was shown by the fact that around many of them foreign body giant cells had formed, a finding never observed in the ordinary types of nephritis.

To sum up then, we have multiple tumors throughout the osseous system, the majority of them rather small but two quite large. There were two metastases outside of the bones. The liver and spleen showed hematopoiesis and myelopoiesis but no involvement by tumor, and the kidneys were of the type characteristically seen with multiple plasma cell myeloma. The histology of the tumors was consistent with, though not entirely characteristic of this condition. A final diagnosis of atypical plasma cell myeloma seemed on the whole most reasonable.

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HORMONES AND HUMAN BEHAVIOR

IN his address at the symposium, "Factors Determining Human Behavior", which was a part of the Harvard Tercentenary Conference of Arts and Sciences, Dr. James B. Collip[1] laid particular stress on the significance of the internal secretions in relation to human behavior. As Hoskins[2] has said, "The evidence is now conclusive that what we are—physically, mentally, sexually and emotionally—depends in no small measure upon the functions of the endocrine glands."

Dr. Collip explained this relatively greater importance in man than in lower animals as being due to the more elaborate development of the frontal lobes of the brain, resulting in impulses to the ductless glands that originate in the higher brain centers, arising from feelings not only of consciousness but also of self-consciousness. The interrelations of the nervous and endocrine systems are many, and normal behavior depends upon proper correlation of the two. Furthermore, he said, individual behavior, dependent as it is upon conscious, self-conscious and unconscious life, must likewise be profoundly influenced by the particular reciprocal relations of the ductless glands and the nervous system.

Proper functioning of bodily functions is dependent, particularly in the higher forms of animal life, upon the preservation of uniform composition of the body or tissue fluid, the "milieu interne" of Claude Bernard. This internal environment, Dr. Collip added, is the only one of the three chief governors of human behavior that can be affected by the hormones directly. The other two, hereditary background and external environment, may produce indirect changes in the hormone patterns of the internal environment. Thus, human behavior, he concluded, can be influenced by the hormones through each of the three determining factors.

REFERENCES

1. Collip, J. B.: Hormones. Scientific Monthly **43**:411 (Nov.) 1936.
2. Hoskins, R. G.: The Tides of Life. New York: W. W. Norton and Co., 1933.

EUTHANASIA OPPOSED IN ENGLAND

ON December 1, 1936, the House of Lords refused to enact legislation to permit physicians to relieve human suffering by euthanasia. Leading opponents of the proposed measure included Lord Dawson of Penn, the King's physician, and the Archbishop of Canterbury. The vote stood at 14 in favor of the bill and 35 against it.

Lord Ponsonby, who advocated the passage of the bill, recorded the prediction that in the course of time Parliament would endorse the measure. He placed the responsibility for the action on the alliance of the medical profession and the prelates of the Church of England.

The Archbishop of Canterbury expressed the opinion that the medical profession should assume all responsibility for the attitude of members toward this question, stating that he would "trust the judgment and honor of the medical profession" at the same time plainly indicating that there may be occasions when it is "morally legitimate to shorten the life of pain".

It is very probable that most of the religious denominations are disinclined to adopt a policy relating to euthanasia, and it is not at all likely that organized medicine in this country would commit itself to a general approval of this practice, because it might impose difficulties of procedure and complications which would outweigh its blessings. One can readily imagine many circumstances which would arouse suspicion as to the propriety of resorting to euthanasia except through adequately safeguarded legal regulations, and even with this resource society at large is not apparently ready to take this step.

For the comfort of the incurably ill, the public may be assured that the medical profession has many resources to assuage the distress of

body and mind after there is no expectation of recovery.

There will undoubtedly be cases when courageous and sympathetic physicians will, under suitable conditions, relieve the incurably sick person without the technical authority conferred by law.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

HOMANS, JOHN. M.D. Harvard University Medical School 1903. Clinical Professor of Surgery, Harvard University Medical School. Professor of Surgery, 1936-1937, Yale University School of Medicine. His subject is "The Treatment of Elephantiasis of the Legs. A Preliminary Report." Page 1099. Address: 721 Huntington Avenue, Boston, Mass.

KAZANJIAN, V. H. M.D. Harvard University Medical School 1921. D.M.D. F.A.C.S. Professor of Clinical Oral Surgery, Harvard University Dental School. Visiting Surgeon, Massachusetts General Hospital. Surgeon for Plastic Operations, Massachusetts Eye and Ear Infirmary. Visiting Surgeon, Oral and Plastic Surgery, Boston City Hospital. Consulting Surgeon of the Collis P. Huntington Memorial Hospital; the New England Deaconess Hospital; the Palmer Memorial Hospital; the Beth Israel Hospital; the Cambridge Hospital, and the Newport Hospital, Newport, R. I. His subject is "The Repair of Contractures Resulting from Burns." Page 1104. Address: 475 Commonwealth Avenue, Boston, Mass.

RICHARDS, LYMAN. A.B., M.D. Harvard University Medical School 1919. F.A.C.S. Surgeon in Otolaryngology, Peter Bent Brigham Hospital. Consultant in Otolaryngology, New England Hospital for Women and Children. Consultant in Bronchoscopy, Union Hospital, Fall River. Associate in Otolaryngology, New England Deaconess and New England Baptist Hospitals. His subject is "Retropharyngeal Abscess." Page 1120. Address: 319 Longwood Avenue, Boston, Mass.

The Massachusetts Medical Society

FOURTH ANNUAL POSTGRADUATE MEDICAL EXTENSION COURSE

The following sessions have been arranged by the Committee for the week beginning December 14:

Bristol North

Thursday, December 17, at 4:00 p. m., at the Morton Hospital, Taunton. Subject: The Prognosis of Heart Disease. Instructor: Ashton Graybiel. Arthur R. Crandell, Chairman.

Bristol South (Fall River Section)

Monday, December 14, at 4:00 p. m., at the Stevens Clinic of the Union Hospital, Fall River. Subject: Suppurative Lung Disease, Lung Abscess and Bronchiectasis. Instructor: F. T. Lord. Howard P. Sawyer, Co-Chairman.

Bristol South (New Bedford Section)

Friday, December 18, at 4:00 p. m., at St. Luke's Hospital, New Bedford. Subject: Anesthesia: (a) Drugs in Anesthesia. (b) General Care of Patient in Anesthesia. Instructor: S. C. Wiggin. Robert H. Goodwin, Co-Chairman.

Norfolk South

Monday, December 14, at 8:30 p. m., at the Quincy City Hospital, Quincy. Subject: Blood Diseases: The Hemoglobin and Red Blood Cells in Relation to Disease. Instructor: M. B. Strauss. David L. Belding, Chairman.

Plymouth

Tuesday, December 15, at 4:00 p. m., at the Brockton Hospital, Brockton. Subject: Diabetes: General Plan of Treatment in *Uncomplicated* Cases; Diet; Insulin (Regular and Protamine); Exercise. Instructor: Reginald Fitz. W. H. Pulsifer, Chairman.

Worcester North

Friday, December 18, at 4:30 p. m., at the Burbank Hospital, Fitchburg. Subject: Acute Abdominal Emergencies. Instructor: H. M. Clute. Edward A. Adams, Chairman.

MISCELLANY

IVY POISON PREVENTIVE

One hundred and thirty men at the CCC veterans' camp, MC-64, Morristown, N. J., served as willing guinea pigs to prove that there is a preventive and a definite cure for ivy poison. Lieutenant-Colonel J. M. Blank, U. S. Medical Reserve Corps, and Dr. Arthur F. Coca, Pearl River, N. Y., physician whom he called in as a consultant in the work, describe its results. (*Journal of Allergy*, September.)

From January the entire command of "2217 V", which includes the Morristown camp, was engaged in mosquito control in New Jersey. This involved much labor and scouting in swampy areas where poison ivy and poison sumac abound. As a result, there had been 129 cases of poison ivy by April 24, sixteen of them so bad that they had required hospital care. The morale of the camp, the report continues, was being adversely affected, and still the number of cases increased.

No really critical tests had ever been made of prevention of the irritation by immunizing with injections into the blood stream, the best method to

use if it would work. The doctors determined to try this way.

They divided the men into three groups. The first received a fairly weak injection of the actual irritant from poison ivy plants in four weekly doses. This caused their blood to prepare a material which would fight off the poison itself when they came into accidental contact with the plants, just as people vaccinated against typhoid fever acquire immunity to that disease. Of the 45 men in this group, only 9 reported poison ivy infection in the 6 weeks following their treatment. A second group was given similar injections, 12 times as strong as the first. The ensuing 6 weeks saw 3 cases develop among them. A third lot, of 45 men again, got no injections. Of these 45, 30 got poison ivy! Members of each group were in each of the work gangs.

The report concludes on a faintly regretful note. As each man was found to have the skin irritation, he was given the anti-poison-ivy injections. Routine inspections saw to it that the cases were diagnosed early. The number of cases decreased from the hundreds earlier in the year to none at all in August. There was one case in September, but that was of a man who had not been immunized.

The regret of the doctors lies in the fact that because of this practice of treating the men as they became ill, nobody was left unvaccinated at the end of the treatments who could be used to tell quite certainly whether the men were being exposed as much as before to the poisoning.—*Science News Letter*, November 21, 1936.

THE DISTRIBUTION OF PHYSICIANS

Former studies have been mainly concerned with determining the ratio of population to physicians as a measure of medical service available in the country concerned. According to these data, the ratio is much lower in the United States as compared with the different European countries. While the European countries have from two to four times as many persons per physician as the United States, the complaint of a surplus of physicians is common to nearly every country. The report of the Commission on Medical Education[1] stated that there were approximately 780 persons per physician in the United States and estimated on actuarial bases that the probable population ratio in this country by the year 1980 would be 680, which seemed conclusive evidence of a definitely increasing oversupply of physicians.

Leland's study analyzes more closely the geographic distribution of physicians in the United States and shows a varying ratio in the different sections of the country, as indicated by a ratio of 583 in Colorado, 614 in New York, 621 in California, 671 in Massachusetts, 966 in New Jersey, 1,040 in Louisiana, 1,340 in North Dakota, and 1,400 in South Carolina. It is arbitrarily assumed that the number of people outside incorporated towns and dependent on the medical facilities in each city is approximately equal; that is, that nearly the same number of persons would be drawn to a city of 1,000 to 5,000 as to one of 100,000 or over.

Leland claims that there is no absolutely accurate method by which to determine the amount of medical service available for a community or the number of persons served by physicians according to the size of the town in which they are located. It is manifestly evident that the extent of patronage in any locality is determined by such diverse factors as good roads, telephones, competition of medical facilities in adjoining communities, income of the population, recommendations of friends and relatives, and so forth. In the large cities the greater number of physicians confining their practice to one of the recognized medical specialties is a further important factor in arriving at an estimation of the general medical service. The study also takes into consideration the number of physicians engaged in teaching and administrative work, or otherwise not in active practice. Any assertions that the medical service of the average community can be measured by the number of physicians within its immediate geographic limits are contrary to well-known facts. —*Federation Bulletin* **22**: No. 11 (Nov.) 1936.

REFERENCE

1. Final Report of the Commission on Medical Education, New York, Office of the Director of Study, 1932.

THE MASSACHUSETTS BOARD OF REGISTRATION IN MEDICINE

PRELIMINARY REPORT ON EXAMINATION
NOVEMBER, 1936

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Repeaters			
(3 or less)	16	65	
(4 or more)	3	43	127
First Time	53	41	94
	72	149	221

LUNCHEON FOR MISS BISSELL, FOUNDER OF THE CHRISTMAS SEAL IN THE UNITED STATES

An honorary luncheon for Miss Emily P. Bissell will be held at the Twentieth Century Club, 3 Joy Street, at one o'clock, December 11. A charge of $1.00 will be made.

Miss Bissell will contribute to the program.

Dr. Horace Paine Stevens, whose father living in Cambridge was cured of tuberculosis in 1865 after being treated by Dr. Henry I. Bowditch, will also speak. His subject is "Tuberculosis Then." Dr. Alton S. Pope, Director of the Division of Tuberculosis, State Department of Public Health, will speak on "Tuberculosis Now."

There will be on display a very extensive exhibit of the tuberculosis Christmas Seals of the nations, including, of course, our own.

AN HONOR CONFERRED ON DR. A. W. SELLARDS

The Laveran Gold Medal of the Société de Pathologie Exotique of Paris has been conferred upon Dr. A. W. Sellards, Associate Professor of Tropical Medicine at the Harvard University Medical School. This medal was conferred first in 1927 upon Sir Arnold Theiler, in 1929 upon Edm. Sergent, in 1931 upon J. Rodhain, in 1933 upon E. Roubaud.

Dr. Sellards has been associated with the French investigators in the study of yellow fever since 1927. This work has culminated in the development of an effective vaccine which has now been employed for the protection of more than 20,000 persons. Dr. Sellards first demonstrated that the virus of yellow fever could be preserved in vitro and transported, and in 1928 he brought the first strain from Africa which was established at once in several laboratories in Europe, London, New York City, and Boston.

CORRESPONDENCE

A HUMILIATING MISSTATEMENT

Boston, December 2, 1936.

Editor, *New England Journal of Medicine,*

At a regular meeting of the Boston Society of Anesthetists held last evening, it was suggested that the following editorial in the *Rhode Island Medical Journal* (19:182 [Nov.] 1936) be brought to your attention:

"To the American College of Surgeons

"On October 16, 1846, at the Massachusetts General Hospital in Boston, William Thomas Green Morton first demonstrated what we now know as Surgical Anesthesia. In the words of William Osler, 'Before October 16, 1846, surgical anesthesia did not exist—within a few months it became a world-wide procedure; and the full credit for its introduction must be given to William Thomas Green Morton, who, on the date mentioned, demonstrated at the Massachusetts General Hospital, the simplicity and safety of ether anesthesia.' That demonstration is the cornerstone of the foundation of Modern Surgery. If it had failed of success, it is unlikely that the American College of Surgeons would now exist. The October *Bulletin of the American College of Surgeons* states: 'The art and science of anesthesia have rapidly advanced since 1844 and 1846 when Crawford Long and Daniel Morton made their historic discoveries.' A misstatement humiliating to all of us, slighting the name of a great benefactor and a topic of professional pride. A comparable error has not been recorded since the London Dictionary of Dates, in 1851, stated that 'the discovery was first made by Mr. Thomas Morton of Boston.' For ignorance of the most momentous event in the history of surgery, the Dictionary of Dates might be forgiven, but not the official publication of the world's greatest surgical society." A. H. M.

Sincerely yours,

Russell F. Sheldon, M.D., *Secretary.*

31 Pinckney Street, Boston.

RECENT DEATHS

CUTLER—Charles Newton Cutler, M.D., a retired physician, and a member of the Massachusetts Medical Society, died in Plainfield, New Hampshire, September 5, 1936.

Dr. Cutler was born in Chelsea, Massachusetts, in 1875, the son of Dr. William T. Cutler and Mrs. Annie (Alden) Cutler. He graduated from the Harvard Medical School in 1898. After retirement, Dr. Cutler lived for ten years in Plainfield except when he was visiting in the South.

TUCKER—George Everett Tucker, M.D., of Salem, Massachusetts, died at the Salem Hospital, November 30, 1936. Dr. Tucker was born in Hyde Park, Massachusetts, where he prepared for Bowdoin College from which he graduated in 1905. He then entered the Bowdoin Medical College and graduated therefrom in 1908, joined the Massachusetts Medical Society in 1908 and was later appointed to membership on the staff of the Salem Hospital, serving to the time of his decease.

He was a member of the Massachusetts Medical Society, the Essex County Bowdoin Alumni Association, the Salem Kiwanis and the Salem Country Clubs.

Dr. Tucker's widow, Mrs. Rachel R. (Dillon) Tucker; a daughter, Miss Barbara Tucker, and a brother, Herbert Tucker, of Arlington, survive him.

McMAHON—Francis Joseph McMahon, M.D., of 376 Washington Street, Brookline, Massachusetts, died at his home, December 1, 1936. He was born in 1884, the son of Mr. and Mrs. Thomas F. McMahon, and was educated at Brookline High School, Holy Cross College, and graduated from the Tufts College Medical School in 1911.

Dr. McMahon was formerly a member of the Massachusetts Medical Society, and was a member of the Holy Cross Club, St. Lawrence's Chapter, M. C. O. F., and the Tufts College Medical School Alumni Association.

For several years Dr. McMahon was associated with the Welfare Department of Brookline.

In addition to his parents and his widow, Mrs. Mildred Ashley McMahon, Dr. McMahon is survived by a daughter, Miss Marie; a son, Francis J., Jr.; a brother, Peter, and a sister, Miss Mary McMahon.

SWAIN—Howard Townsend Swain, M.D., of 226 Commonwealth Avenue, Boston, died at his home, December 6, 1936.

Dr. Swain was born in 1868 and, after graduating from Phillips Exeter Academy, entered the Harvard Medical School graduating therefrom in 1897.

He served six years at the Massachusetts General Hospital and the Boston Lying-in Hospital and later served on the staffs of these hospitals for several years.

He was a Fellow of the Massachusetts Medical Society and the American Medical Association.

Dr. Swain is survived by his widow, Mrs. Harriet

French Swain; a son, Howard T. Swain, Jr., of Denver, Colorado, and two daughters, Mrs. C. Rodgers Burgin, of Milton, and Mrs. Henry K. U. Beecher, of Boston.

NOTICES

SUNDAY AFTERNOON LECTURES AT THE HARVARD MEDICAL SCHOOL

The Faculty of Medicine of Harvard University offers a course of free public lectures on medical subjects, to be given at the Medical School, Building D, Longwood Avenue, Boston, on Sunday afternoons, beginning next January 10 and ending March 21. The lectures will begin at four o'clock and the doors will be closed at five minutes past the hour. No tickets are required.

The schedule is as follows: January 10, Professor Philip Drinker, "Air-Conditioning and Health"; January 17, Dr. Soma Weiss, "Blood Pressure—Low and High"; January 24, Dr. Tracy J. Putnam, "Pain and Its Treatment"; January 31, Dr. C. Macfie Campbell, "Social Stress and Mental Health"; February 7, Dr. William T. Salter, "Cancer"; February 14, Dr. Edward D. Churchill, "Surgical Aid in Lung Diseases"; February 21, Dr. Theodore L. Terry, "The Care of the Eyes"; February 28, Dr. Louis K. Diamond, "The Anemic Child"; March 7, Dr. William H. Robey, "Preparing for a Comfortable Old Age"; March 14, Dr. Arthur Hertig, "Abnormal Terminations of Early Pregnancy," and March 21, Dr. Joseph C. Aub, "Glands of Internal Secretion and Human Activity".

MASSACHUSETTS MEMORIAL HOSPITALS

There will be a luncheon meeting of the Surgical Section in the Aid Association Room, ground floor, Talbot Memorial, 82 East Concord Street, Boston, on Friday, December 11, 1936, at 12 noon.

Surgical deaths during the month of October will be discussed.

MILO C. GREEN, *Secretary.*

CLINICS FOR CRIPPLED CHILDREN IN MASSACHUSETTS, UNDER THE PROVISIONS OF THE SOCIAL SECURITY ACT

Clinic — Date — Orthopedic Consultant

Haverhill—January 6, 1937—Dr. Arthur T. Legg.
Brockton — January 14, 1937—Dr. George W. Van Gorder.
Salem—January 4, 1937—Dr. Harold C. Bean.
Gardner—January 12, 1937—Dr. Mark H. Rogers.
Greenfield — December 11, 1936; January 8, 1937—Dr. Harry R. Wheat.
Pittsfield — December 14, 1936; January 18, 1937—Dr. Francis A. Slowick.
Springfield—December 16, 1936; January 20, 1937—Dr. Garry deN. Hough, Jr.
Worcester — December 18, 1936; January 15, 1937—Dr. John W. O'Meara.
Lowell—December 19, 1936; January 30, 1937—Dr. W. Russell MacAusland.
Hyannis—December 22, 1936; January 26, 1937—Dr. Paul Morton.
Fall River—December 28, 1936; January 25, 1937—Dr. Eugene McCarthy.

BOSTON CITY HOSPITAL

The Ophthalmic Service of the Boston City Hospital invites physicians to attend the Henry Willard Williams Memorial Lecture, Wednesday, December 16, 1936, at 8:15 p. m., in the Cheever Amphitheater.

This will be given by Dr. Allen Greenwood, who is Consulting Ophthalmic Surgeon at the Boston City Hospital, and the Massachusetts Eye and Ear Infirmary. Dr. Greenwood was formerly President of the American Academy of Ophthalmology and Oto-Laryngology. His subject is "History of Ophthalmology in New England."

Dr. Benjamin Sachs, Professor of Ophthalmology at Tufts College Medical School, will preside.

Physicians, medical students and nurses are cordially invited.

JAMES W. MANARY, M.D., *Medical Director.*

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

DEPARTMENT OF BIOLOGY AND PUBLIC HEALTH

Invitations to attend the Ninth Massachusetts Institute of Technology Delta Omega Lecture have been issued.

Time: Wednesday, December 16, 1936, at 5:00 p. m.
Place: Room 10-250, Massachusetts Institute of Technology, Cambridge.
Subject: The Place of Health Education in National Health Programs.

Illustrated by motion pictures in natural color showing school children and scenic beauties in various countries.

Speaker: Clair E. Turner, Dr.P.H., Professor of Biology and Public Health, Massachusetts Institute of Technology.

The lecture is open to all who are interested.

MEDICAL CLINIC AT THE PETER BENT BRIGHAM HOSPITAL

At 3:30 p. m. on Thursday, December 17, in the Amphitheater of the Peter Bent Brigham Hospital, Dr. William P. Murphy, Associate in Medicine, Harvard Medical School and Senior Associate in Medicine, Peter Bent Brigham Hospital, will give a medical clinic. To it are cordially invited practitioners and medical students.

The clinics for December 24 and 31 will be omitted owing to the holidays. The next clinic will be given by Dr. Christian on January 7.

WORCESTER CLINIC FOR CRIPPLED CHILDREN

Under the Social Security Act, Massachusetts has organized Services for Crippled Children to be administered by the Department of Public Health. These services will be conducted in close cooperation with the Massachusetts Medical Society; the

matter has already been brought before the President and Secretary of your District Medical Society.

It is proposed to hold the first clinic in Worcester in the near future. Physicians of the Worcester District Medical Society are requested to make application to the Department of Public Health at the State House for such services for any crippled children under the age of 21 years, who are unable to pay for necessary medical and surgical care or for apparatus. A committee consisting of the following members has been designated by the President of the Worcester District Medical Society to pass on the eligibility of patients for such care: Dr. Ralph S. Perkins, Worcester; Dr. James A. Givan, Worcester; Dr. Joseph P. Mulhern, Worcester; Dr. Charles V. King, Worcester; Dr. Gilman V. Chase, Clinton; Dr. Alvin R. Moses, Charlton; Dr. John W. O'Meara, Worcester; Dr. Charles E. Ayers, Worcester; Dr. John B. Kelley, Worcester; Dr. Leslie R. Bragg, Webster; Dr. John V. Gallagher, Milford; Dr. Kent T. Royal, North Brookfield.

Dr. Paul Wakefield, Supervisor of Clinics for Crippled Children, will consult the above-named committee and will be in Worcester several days before the clinic is held, and can be located through Dr. John W. O'Meara, the Orthopedic Consultant of this clinic. Dr. Wakefield will be glad to confer with you on any question that occurs to you.

"Crippled children" is defined as follows:

"For administrative purposes, the term 'crippled children' is understood to include those children under 21 years of age who are suffering from poliomyelitis, bone and joint tuberculosis, congenital defects, cardiac conditions, arthritis, and such other similar conditions as may lead to or have produced crippling, and which may be treated advantageously. It is planned to include children under the age of 21 years who require plastic operations following burns, accidents, congenital defects such as harelip, cleft palate, and so forth. It is not planned to include the care of children who are the victims of 'acute' accidents, or who require operations for hernia, or for the removal of tonsils and adenoids, nor is it planned to provide custodial care for children of low mentality or for other children."

Attention is also invited to the fact that it is now possible to admit to the Lakeville State Sanatorium patients of all ages, who are crippled as a result of poliomyelitis.—*Excerpts of a letter from Henry D. Chadwick, M.D., Commissioner of Public Health.*

ANNOUNCEMENT

LESLIE H. VAN RAALTE, M.D., announces the opening of an office at the Munroe Building, 1245 Hancock Street, Quincy, Mass.

REPORTS AND NOTICES OF MEETINGS

WILLIAM HARVEY SOCIETY

The William Harvey Society of the Tufts College Medical School met on November 6, 1936, in the Auditorium of the Beth Israel Hospital, Dr. James J. Hepburn presiding. Dr. Allen O. Whipple, Professor of Surgery in Columbia University, spoke on the subject "Recent Advances in Surgery of the Pancreas." Dr. Whipple pointed out that, until within the last five years, surgery of the pancreas had been limited to treatment of acute inflammation by incision and drainage, and to evacuation of cysts, which usually had to be marsupialized. Tumors were rarely attacked, due to fear of pancreatitis, duodenal leakage, or insufficiency of the gland. During the years 1930 to 1936, Dr. Whipple has surgically treated 91 cases of pancreatic disease of the following types:

Diseases	No. of cases
Acute pancreatitis	19
Chronic pancreatitis	10
Cysts of the pancreas	7
Dermoid cysts of pancreatic region	2
Cystadenomas of the pancreas	4
Islet adenomas with hyperinsulinism	6
Diffuse islet hypertrophy	1
Sarcoma of the pancreas	1
Carcinoma of the pancreas	34
Carcinoma of the papilla of Vater	5
Carcinoma of the duodenum	2

Acute pancreatitis was first completely described by Dr. Reginald H. Fitz in the *Boston Medical and Surgical Journal* in 1889. Little has been added to our knowledge of the pathology of the condition since his observations. Tissue destruction is due to the proteolytic action of activated trypsinogen in the pancreatic secretions. The trypsinogen may be activated by the regurgitation of bile into the pancreatic ducts, or by the ferments liberated by broken down leucocytes, or ischemic pancreatic tissue. The toxemia of acute pancreatitis resembles the symptoms often observed in high obstruction of the gastrointestinal tract or in severe burns. There is a marked disturbance of the electrolyte and fluid balance of the body, and it is believed by Dr. Whipple and his coworkers that the symptoms may be due to an increase in the amount of potassium in the blood. The belief that operation should be performed as soon as the diagnosis of acute pancreatitis has been made has been proved false. The low blood pressure, and circulatory collapse should be corrected by administration of intravenous saline and glucose, transfusion, heat and morphine. After improvement in the clinical condition it is possible to tell whether the patient is suffering from an acute or subsiding process, and whether an operation is indicated. The treatment of acute pancreatitis by making multiple openings in the capsule is dangerous, since it injures more tissue, and may precipitate more difficulties. Dr. Whipple advocates removal of the free peritoneal fluid, and the placing of a drain near the involved portion of the pancreas without incision of the capsule. If there is an associated jaundice the gallbladder should also be drained.

The differential diagnosis of acute pancreatitis

and other upper abdominal conditions may be aided by determinations of the value of the serum amylase. In acute pancreatitis this value is found to be markedly elevated, probably because of edema of the periductal tissues and partial obstruction of the pancreatic ducts. In a series of 11 cases of acute pancreatitis observed by Dr. Whipple, there was a high level of the serum amylase in 9 patients. He has found that the viscosimetric method of Thompson is the most satisfactory, since it is subject to only two per cent error. The slow, chronic occlusion of the ducts occurring in tumors of the head of the pancreas causes very little rise in serum amylase levels due to atrophy of the pancreatic tissues.

Cysts of the pancreas may be divided into four main groups:

(1) Retention cysts.
(2) Cysts associated with neoplastic diseases (e.g., cystadenoma).
(3) Pseudocysts (developing after trauma).
(4) Dermoid cysts situated behind the pancreas.

The majority of cysts are closely adherent to the celiac axis and its branches. Only those lying in the tail of the pancreas can be removed completely, and the larger the cyst the greater is the danger associated with its removal. Dr. Whipple marsupializes these cysts to the anterior abdominal wall, and places a Wangensteen drain in the cavity to keep it dry. Primary healing of the wound is obtained and good granulation tissue forms with the contraction of the cyst wall. The sutures are removed, and a sclerosing solution is instilled into the cavity. Such instillations must not be made until after the tenth postoperative day, and not more often than every other day. Six to 10 applications are sufficient to secure contraction of the cavity, and early closing of the wound. Dr. Whipple emphasized the importance of using silk technic in these operations. Such technic demands complete asepsis, absolute hemostasis, the use of fine instruments and careful regard for primary union, conditions essential in surgery of the pancreas. Large bites of hemostats and catgut sutures lead to necrosis of tissue and activation of pancreatic ferments with resultant digestion of the catgut and severe hemorrhage.

Since 1929 when Graham removed the first islet adenoma with relief of the symptoms of hyperinsulinism there have been 19 cases of islet adenomas reported in the literature in which operative treatment was successful. Six of these cases were Dr. Whipple's patients. Not all cases of hypoglycemia are due to pancreatic disease. Lesions of the pituitary and floor of the fourth ventricle and certain types of liver disease may produce a chronic lowering of blood sugar, and must be considered in the differential diagnosis. An important diagnostic procedure is the injection of adrenalin. Mobilization of sugar will occur in cases of hyperinsulinism, but not in cases of hypoglycemia due to other causes. Medical treatment of hyperinsulinism is only rarely successful, and in cases failing to respond to such treatment surgical intervention is indicated. Dr. Whipple has found spinal anesthesia most satisfactory for such operations, and he uses a transverse incision through both recti muscles. The gastrocolic omentum is incised, and the whole pancreas carefully inspected for adenomatous growths, which usually appear as purplish-pink nodules, and occur most frequently in the tail of the pancreas. Search should be made for more than one such adenoma, since they are occasionally multiple. They are usually easily shelled out, and are covered by a firm capsule. If no adenoma is found, two-thirds of the pancreas should be resected. All silk technic must be used in all cases, and only those cases are drained in which resection is necessary. In the reported cases there have been no fatalities, and, in all of the cases in which an adenoma was removed, the hypoglycemia was cured. Some of the cases developed hypoinsulinism following operation, and had to be treated with injections of insulin.

Operations for malignancy of the pancreas are extremely hazardous because of the dangers of pancreatitis and the poor condition of the patients at the time of operation. Removal of malignant growths of the pancreas or of the ampulla of Vater should be made in two stages. In the first stage a gastrojejunostomy and cholecystgastrostomy should be performed, and the common duct ligated. The second stage should be performed three weeks later, at which time a portion of the duodenum is excised together with a V-shaped section of the pancreas including the tumor. The ends of the duodenum are inverted, and the cut edges of the pancreas are sutured together. The wound is closed with drainage. All of the four cases treated in this manner survived the operation, but have suffered from cholangitis because of infection entering the biliary system through the cholecystgastrostomy. Dr. Whipple hopes to eliminate this drawback in future operations by modifications of the gastrojejunostomy and cholecystgastrostomy.

GREATER BOSTON MEDICAL SOCIETY

The first meeting of the Greater Boston Medical Society for the current year was held at the Beth Israel Hospital Auditorium on November 10, 1936. The paper of the evening was presented by Dr. I. M. Rabinowitch, Assistant Professor of Medicine and Lecturer in Pathological Chemistry in McGill University Medical School, on the subject: "Effects of Protamine-Zinc-Insulin and Other Mixtures of Zinc and Insulin in Diabetes Mellitus."

During the past eleven years numerous unsuccessful attempts have been made to retard the rapidity of the action of insulin by combining it with certain metals. Recently Hagedorn has succeeded in retarding the rate of absorption of subcutaneously injected insulin by uniting it with protamine. The prolonged action of protamine insulin is not entirely accounted for by the delay in absorption, however.

In 1934 Scott found that pure insulin practically

always contained zinc when crystallized. If zinc were added to insulin the action of the latter was found to be prolonged, and with excessively large amounts of zinc the activity of insulin can be almost completely blocked. Zinc has been found to form a very complex compound with insulin and protamine, and by means of spectrographic methods it has been possible to determine the exact amount of zinc present in such molecules. All commercial preparations of insulin have been found to contain a certain amount of zinc, varying in amount from 0.626 to 1.15 mg. per 500 units.

Dr. Rabinowitch has used an insulin preparation containing 1 mg. of zinc per 500 units, and the patients studied have been on a high carbohydrate—low calorie diet. The preparation used is very stable, and has retained its full potency for a period of nine months, even when kept at room temperature. Use of crystalline zinc-insulin caused the blood sugar of diabetics to be maintained at normal low levels for a length of time comparable to that obtained by use of protamine-insulin. Protamine-zinc-insulin maintained low blood sugar levels for a much longer time than either of these preparations, however. Patients on the "ladder diet" required a smaller dosage of protamine-zinc-insulin to maintain a normal blood sugar than those placed on the routine high carbohydrate—low calorie diet immediately, and the time required for diet and insulin regulation in the former group was only half that required for the latter. Of all the cases treated with protamine-zinc-insulin none have experienced insulin reactions, a fact which may be explained by the ability of the body to liberate glucose into the blood by means of the adrenal mechanism more rapidly than it can be depleted by the slowly acting insulin compound.

The appearance of transient glycosuria in an apparently well controlled diabetic should not be considered an indication for increase in insulin dosage, since glycosuria continues for several hours after the blood sugar has risen above the renal threshold, even though there is immediate fall of blood sugar to normal levels.

Using protamine-zinc-insulin, Dr. Rabinowitch has been able to reduce the number of injections to but one per day, and the dosage required is smaller than that required for pure insulin. Of 133 cases of diabetes mellitus receiving therapy with this new preparation, there have been only six failures, all in patients in whom therapy with other insulin preparations was also a failure.

Following the conclusion of Dr. Rabinowitch's paper the meeting was opened for discussion. Several physicians told of the success with which they had used protamine-zinc-insulin and protamine-insulin.

MASSACHUSETTS GENERAL HOSPITAL

A Clinical Meeting of the Staff of the Massachusetts General Hospital will be held in the Moseley Memorial Building, on Thursday, December 17, 1936, at 8:15 p. m.

PROGRAM

1. Case Presentations.
2. Differential Diagnosis of Lung Tumors—Donald S. King, M.D.
3. Surgical Treatment of Lung Tumors — E. D. Churchill, M.D.

There will be an exhibit before and after the meeting that will end promptly at 10 p. m.

Physicians, medical students, nurses and social workers are cordially invited.

Committee on Hospital Meetings
GRANTLEY W. TAYLOR, M.D., *Chairman*,
EARLE M. CHAPMAN, M.D., *Secretary*.

NEW ENGLAND PHYSICAL THERAPY SOCIETY

The regular meeting of the New England Physical Therapy Society will be held at the Hotel Victoria, 271 Dartmouth Street, Boston, on Wednesday evening, December 16, 1936, at 8 p. m.

Prior to the program there will be a meeting of the Council at 6 p. m., followed by a Round Table Dinner at 6:30 p. m.

PROGRAM

The Intensity of the Solar Radiation. Leslie Lyle Campbell, Ph.D., Cambridge, Mass., Professor of Physics, Simmons College.

Cell Response to Physical Measures. George E. Percy, M.D., Salem, Mass.

Question Period.

All members of the medical profession are cordially invited to attend.

WILLIAM D. MCFEE, M.D., *Secretary*.

41 Bay State Road, Boston, Mass.

TUFTS COLLEGE MEDICAL ALUMNI CLUB OF WORCESTER COUNTY

There will be a meeting of the Tufts College Medical Alumni Club, Wednesday evening, December 16, at the Worcester City Hospital (Thayer Hall, Nurses' Home). At 6:30 p. m. dinner will be served for which a charge of $1.50 will be made.

The Scientific Program is scheduled for 7:30 p. m. Dr. Siegfried Thannhauser, Associate Professor of Medicine, Tufts College Medical School, will present a "Clinical Presentation and Discussion of Ward Cases from the City Hospital."

Dr. Thannhauser was Instructor of Internal Medicine at the University of Munich in 1917. He served at Muller Clinic, Munich, for 14 years; has been Professor of Medicine and Physician-in-Chief, University of Heidelberg; Professor of Medicine and Physician-in-Chief at the Medical Academy in Dusseldorf, and Professor of Medicine and Chief of Clinic at the University of Freiberg.

Since 1935, Dr. Thannhauser has been associated with the Boston Dispensary.

F. WASHBURN, M.D., *President*,
N. S. SCARCELLO, M.D., *Secretary*.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

The three hundredth and thirteenth meeting of the New England Ophthalmological Society will be held on Tuesday, December 15, 1936, at the Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston.

The Clinical-Pathologic Conference is scheduled for 4:15 p. m., the subject being "Sympathetic Ophthalmia" (1) Clinical Cases, (2) Review of Literature, (3) Pathological Slides.

At 8:00 p. m. there will be a demonstration of new instruments as follows: Modified Souter Tonometer, by Dr. J. J. Regan; New Needle Holder, by Dr. F. H. Verhoeff; Irrigation Speculum, by Dr. W. B. Lancaster, and LaCarrere Diathermy Needle, by Dr. E. B. Dunphy.

An address entitled "Ocular Allergy" will be delivered by Dr. Albert D. Ruedemann of Cleveland, Ohio. Discussion will then be opened by Dr. Francis M. Rackemann of Boston.

BOSTON SOCIETY FOR THE ADVANCEMENT OF GASTROENTEROLOGY

There will be a meeting of this society in the Cheever Amphitheater, Boston City Hospital, January 15, 1937, 12:00 m.-1:00 p. m.

Dr. P. E. Truesdale will speak on "Gastro-Enterostomy as It Has Been Practiced for the Last Twenty-Five Years."

Physicians and medical students are invited to attend.

LESTER R. WHITAKER, M.D., *Secretary-Treasurer.*
41 Bay State Road,
Boston, Massachusetts.

NEW ENGLAND HEART ASSOCIATION

The next meeting of the New England Heart Association will be held at the Boston City Hospital in the Amphitheater of the Mallory Institute of Pathology on Monday, December 14, 1936, at 8:15 p. m.

PROGRAM

1. Demonstration of Specimens in Relation to Symptoms: A. Subaortic Stenosis: B. Cardiac Perforation from Solitary Abscess. Dr. Soma Weiss.

2. Circulatory Effects of Nitroglycerine. Dr. James G. M. Hamilton.

3. The Effect of Thrombophlebitis on the Venous Valve. Drs. Edward A. Edwards and Jesse E. Edwards.

4. The Relation of the Nutritional Deficiencies to the Cardiovascular System.

A. The Relation of Vitamin C to Rheumatic Fever. Dr. James M. Faulkner.

B. The Clinical Features and the Characteristics of the Disturbance of the Heart and of the Circulation in Nutritional Deficiencies. Dr. Robert W. Wilkins.

C. Vitamin B_1 Deficiency and the Heart in the Bat. Drs. Paul M. Zoll and Florence W. Haynes.

D. Structural Characteristics of the Heart in Deficiencies, and Therapy. Dr. Soma Weiss.

All members of the New England Heart Association and interested physicians are invited to attend.

JAMES M. FAULKNER, M.D., *Secretary.*

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

The next meeting of the Society will be held at the Boston Medical Library, on Thursday evening, December 17, 1936, at 8:15 o'clock.

PROGRAM

Contributions to the Mind-Body Problem

1. Introduction.
   Dr. Frank Fremont-Smith.
2. Environmental Stress as a Precipitating Factor in Rheumatoid Arthritis.
   Dr. Walter Bauer, (by invitation), Dr. Stanley Cobb, and Dr. Isabel Whiting (by invitation).
3. Report of a Patient with Hysteria.
   Dr. Mandel E. Cohen (by invitation), Dr. Frederick S. Coombs (by invitation), and Dr. John H. Talbott (by invitation).
   I. Studies on a Patient with Hysteria.
   Dr. Mandel E. Cohen.
   II. The Acid Base Balance of the Blood in Hysterical Hyperventilation.
   Dr. John H. Talbott.

H. HOUSTON MERRITT, *Secretary.*
Boston City Hospital,
Boston, Massachusetts,
December 4, 1936.

BOSTON MEDICAL HISTORY CLUB

8 Fenway
Monday, December 21, 1936, at 8:15 p. m.
At the Boston Medical Library

"The Many Sided Galen." Fred B. Lund, M.D.

"Guy Patin — A Sixteenth Century Parisian Physician." Merrill Moore, M.D.

BENJAMIN SPECTOR, M.D., *Secretary.*

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING MONDAY, DECEMBER 14, 1936

Monday, December 14—

*8:15 p. m. New England Heart Association. Boston City Hospital, Amphitheater of the Mallory Institute of Pathology.

Tuesday, December 15—

*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. Blood Clinic. Dr. William Dameshek.

9:30 a. m. Massachusetts General Hospital. Thoracic Clinic. Ether Dome.

*12 m. South End Medical Club. Office of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston.

4:15 p. m. New England Ophthalmological Society. Clinical - Pathologic Conference. Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston.

8 p. m. New England Ophthalmological Society. Demonstration of New Instruments. Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston.

Wednesday, December 16—

8 a. m. Massachusetts General Hospital. Grand Rounds—Orthopedic Department.
*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. Hospital Case Presentation. Dr. S. J. Thannhauser.
†12 m. Clinical-Pathologic Conference. Children's Hospital Amphitheater.
4 p. m. - 5 p. m. Surgical Pathological Conference, Dr. Cutler and Dr. Wolbach, Peter Bent Brigham Hospital.
*5 p. m. Massachusetts Institute of Technology, Department of Biology and Public Health, Delta Omega Lecture. Room 10-250.
*8 p. m. New England Physical Therapy Society. Hotel Victoria, 271 Dartmouth Street, Boston.
*8:15 p. m. Boston City Hospital. Ophthalmic Service. Henry Willard Williams Memorial Lecture. Cheever Amphitheater.

Thursday, December 17—

8 a. m. Massachusetts General Hospital. Circulatory Clinic Rounds.
*8:30 - 9:30 a. m. Exchange visit, Surgical and Orthopedic Staffs of the Peter Bent Brigham and the Children's Hospitals, held this week at The Children's Hospital.
*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. Social Service Case Presentation. Miss E. R. Canterbury.
11 a. m Massachusetts General Hospital. Medical Grand Rounds—Ether Dome.
12 m. Massachusetts General Hospital. Clinical-Pathologic Conference.
*3:30 p. m. Medical Clinic, Peter Bent Brigham Hospital. Dr. William P. Murphy.
*8:15 p. m. Massachusetts General Hospital, Clinical Meeting of the Staff. Moseley Memorial Building.
8:15 p. m. Boston Society of Psychiatry and Neurology. Boston Medical Library.

Friday, December 18—

*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. Body Fluid Loss and Repair. Dr. Allan M. Butler.
12 m. Massachusetts General Hospital. Urological Conference. Out-patient Department.

Saturday, December 19—

*9 a. m. - 10 a. m. Boston Dispensary, 25 Bennet Street, Boston. Hospital Case Presentation. Dr. S. J. Thannhauser.
*10 a. m. - 12 m. Staff Rounds at the Peter Bent Brigham Hospital. Conducted by Dr. Henry A. Christian.

*Open to the medical profession.
†Open to Fellows of the Massachusetts Medical Society.

December 10—Pentucket Association of Physicians. Hotel Bartlett, 95 Main Street, Haverhill, at 8:30 p. m.
December 11—William Harvey Society. Auditorium of the Beth Israel Hospital, Boston, 8 p. m.
December 11—Massachusetts Memorial Hospitals, Luncheon Meeting of Surgical Section. See page 1141.
December 14—New England Heart Association. See page 1145.
December 15—New England Ophthalmological Society. See page 1145.
December 15—Massachusetts Eye and Ear Infirmary, Monthly Clinico-Pathological Conference. See page 949, issue of November 12.
December 15—South End Medical Club. Office of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, at 12 noon.
December 16—Massachusetts Institute of Technology, Department of Biology and Public Health, Delta Omega Lecture. See page 1141.
December 16—Boston City Hospital. Ophthalmic Service, Henry Willard Williams Memorial Lecture. See page 1141.
December 16—Tufts College Medical Alumni Club of Worcester County. See page 1144.
December 16—New England Physical Therapy Society. See page 1144.
December 17—Medical Clinic at the Peter Bent Brigham Hospital. See page 1141.
December 17—Massachusetts General Hospital, Clinical Meeting of the Staff. See page 1144.
December 17—Boston Society of Psychiatry and Neurology. See page 1145.
December 21—Boston Medical History Club. See page 1145.
January 10 - March 21, 1937—Sunday Afternoon Lectures at the Harvard Medical School. See page 1141.
January 15, 1937—Boston Society for the Advancement of Gastroenterology. See page 1145.
February 25, 26, 27, 1937—The New England Hospital Association. Hotel Statler, Boston.
March 30 - April 2, 1937—First International Conference on Fever Therapy. Postponement notice. See page 52, issue of July 2.
April 21-24, 1937—American Society for Experimental Pathology. See page 1075, issue of May 21.
October 25-29, 1937—American College of Surgeons. Chicago, Illinois.

DISTRICT MEDICAL SOCIETIES

FRANKLIN DISTRICT MEDICAL SOCIETY

Will meet at the Weldon in Greenfield at 11 a. m. the second Tuesdays of January, March and May.

CHARLES MOLINE, M.D., Secretary.
Sunderland.

MIDDLESEX EAST DISTRICT MEDICAL SOCIETY

January 13, 1937—Bear Hill Golf Club, Stoneham.
March 16, 1937—Danvers State Hospital, Danvers.
May 11, 1937—Bear Hill Golf Club, Stoneham.

KENNETH L. MACLACHLAN, M.D., Secretary.
1 Bellevue Avenue, Melrose.

NORFOLK DISTRICT MEDICAL SOCIETY

January 19, 1937—8:15 p. m. The Peter Bent Brigham Hospital. Communications and Case Presentations by the Staff. Suggested title—"Abdominal Pain from the Medical and Surgical Standpoint." Details of program to be announced.
February 23, 1937—Time, place and details of program to be announced.
March 30, 1937—8:15 p. m. New England Deaconess Hospital. A Symposium on Diabetes entitled "A Survey of the Diabetic Work of the George F. Baker Clinic in the New England Deaconess Hospital." Communications and Case Presentations by the Staff. Drs. Elliott P. Joslin, Howard F. Root, Priscilla White, Alexander Marble and Allen P. Joslin.
May, 1937—Annual Meeting. Details to be announced.

Note: The Censors will meet for the examination of candidates on the first Thursday of May, 1937. Fee of $10.00 is payable at the time of examination. Application blanks may be obtained by writing the Secretary, furnishing name, address and name of school of graduation in medicine. Application must be made at least three weeks prior to date of examination. Candidates whose applications are on file will receive proper notices.

FRANK S. CRUICKSHANK, M.D., Secretary.
1247 Beacon Street, Brookline.

PLYMOUTH DISTRICT MEDICAL SOCIETY

January 21, 1937—11 a. m. Bridgewater State Farm.
March 18, 1937—11 a. m. Brockton Hospital.
April 15, 1937—Annual Meeting. 11 a. m. Ducy Hospital.
May 20, 1937—11 a. m. Lakeville State Sanatorium.

FRED F. WEINER, M.D., Secretary.
231 Main Street, Brockton.

SUFFOLK DISTRICT MEDICAL SOCIETY

January 27, 1937—Boston Medical Library. 8:15 p. m. Joint Meeting with the Boston Medical Library. "Anthropology." Dr. Carleton S. Coon.
March 31, 1937—Boston Medical Library. 8:15 p. m. "Social Insurance—It Affects the Medical Profession." Dr. Charles E. Mongan. Discussion: Dr. Channing Frothingham.
April 28, 1937—Annual Meeting. Boston Medical Library. 8:15 p. m. "Problems in Surgical Diagnosis." Dr. Howard M. Clute.

CONRAD WESSELHOEFT, M.D., President,
CHARLES C. LUND, M.D., Secretary.

WORCESTER DISTRICT MEDICAL SOCIETY

January 13, 1937—Worcester City Hospital, Worcester, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

February 10, 1937—Worcester State Hospital, Worcester, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

March 10, 1937—The Memorial Hospital, Worcester, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

April 14, 1937—Worcester Hahnemann Hospital, Worcester, Mass. 6:15 p. m.: Dinner—complimentary by the hospital. 7:30 p. m.: Business session and scientific program.

May 6, 1937—At 4:30 in the rooms of the Worcester Medical Library, Inc., at 34 Elm Street, Worcester, will be held the spring meeting of the Board of Censors.

Wednesday Afternoon and Evening, May 12, 1937—Annual Meeting. Time and place for this meeting will be announced in an early spring issue of the Journal.

ERWIN C. MILLER, M.D., Secretary.
27 Elm Street, Worcester.